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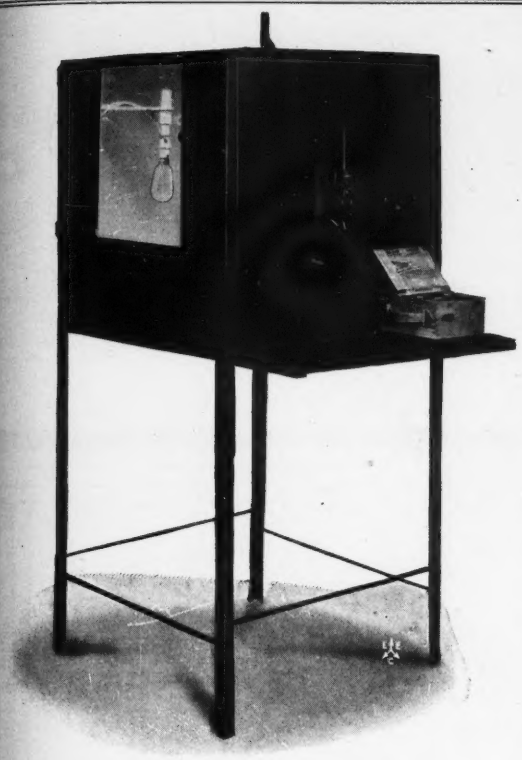

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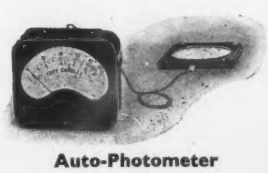

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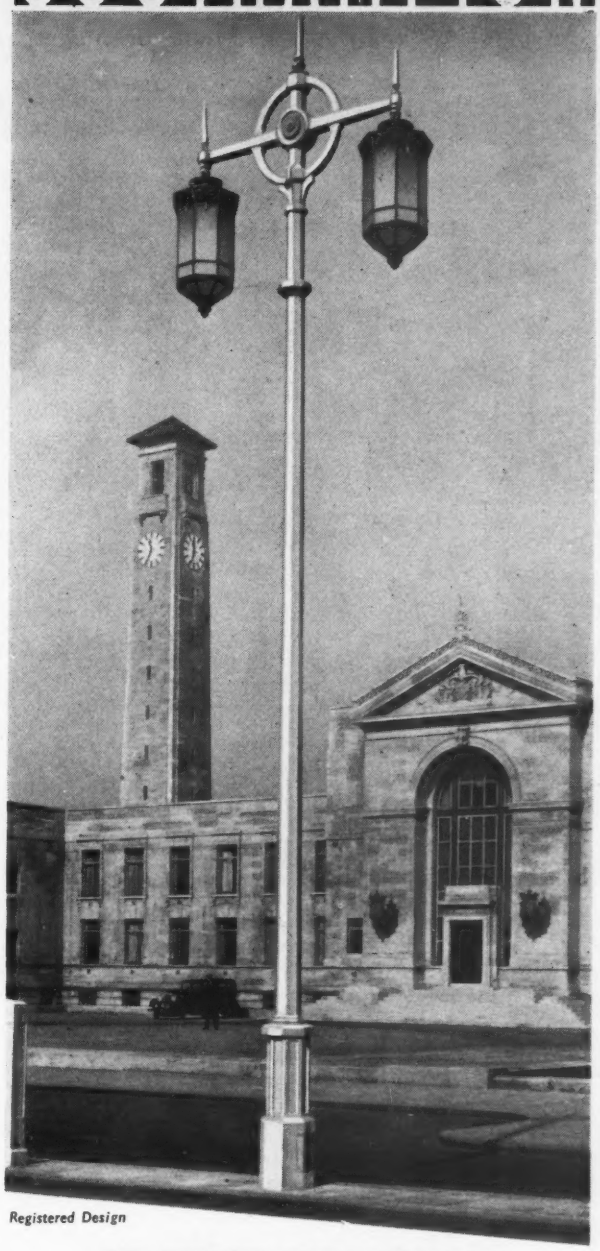
SOUTHAMPTON



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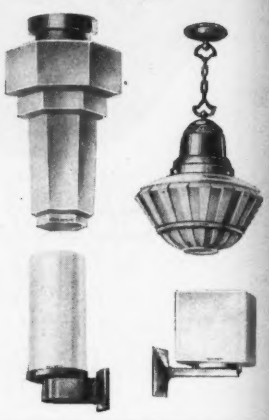

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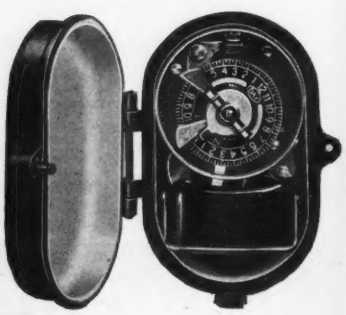

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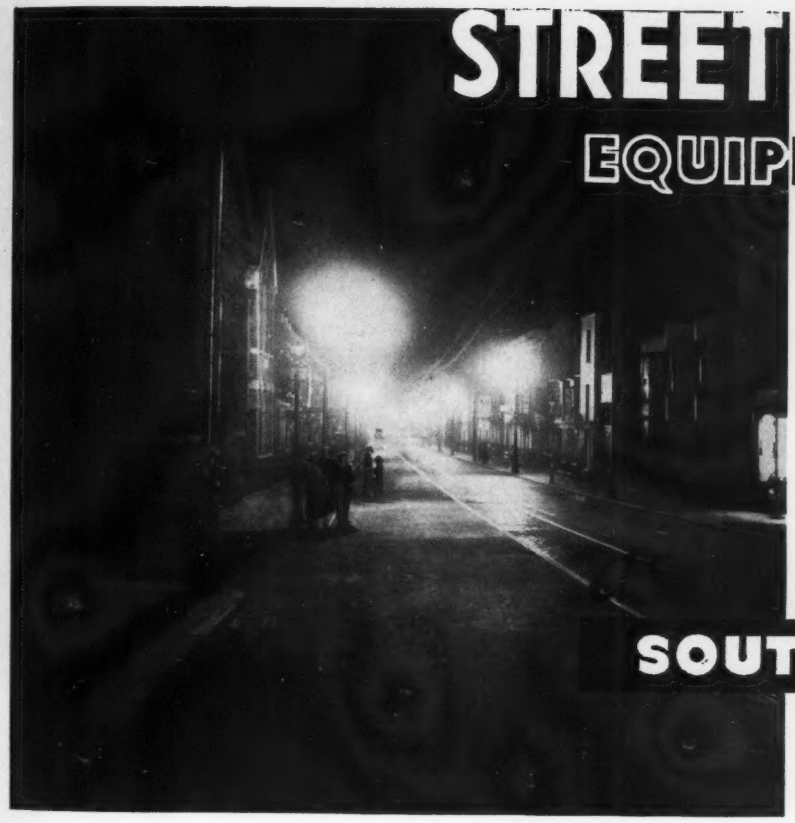

SOUTHAMPTON *did*

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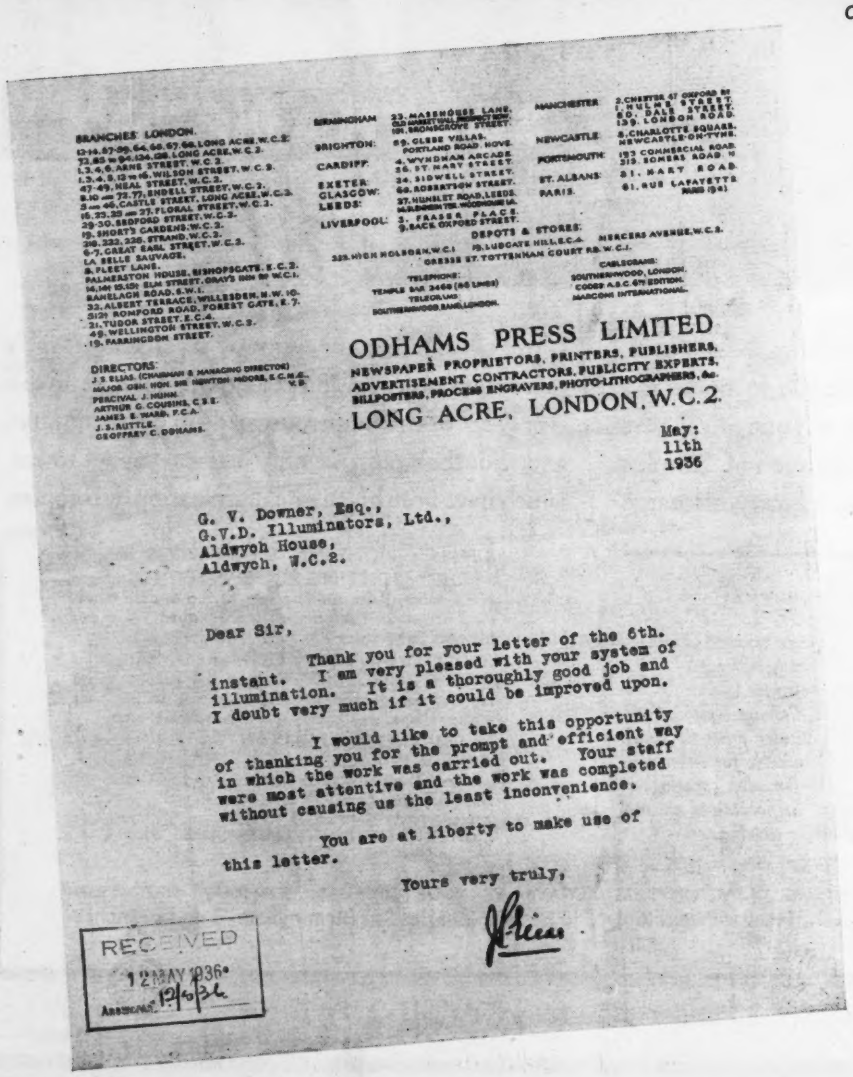

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72, 83 to 94, 124, 126, LONG ACRE, W.C.2.
1, 3, 4, 5, ARNE STREET, W.C.2.
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47-49, NEAL STREET, W.C.2.
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2 and 45, CASTLE STREET, LONG ACRE, W.C.2.
16, 23, 29 and 27, FLORAL STREET, W.C.2.
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May: 11th 1936

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I would like to take this opportunity of thanking you for the prompt and efficient way in which the work was carried out. Your staff were most attentive and the work was completed without causing us the least inconvenience.

You are at liberty to make use of this letter.

Yours very truly,

RECEIVED 12 MAY 1936 Answered 12/5/36

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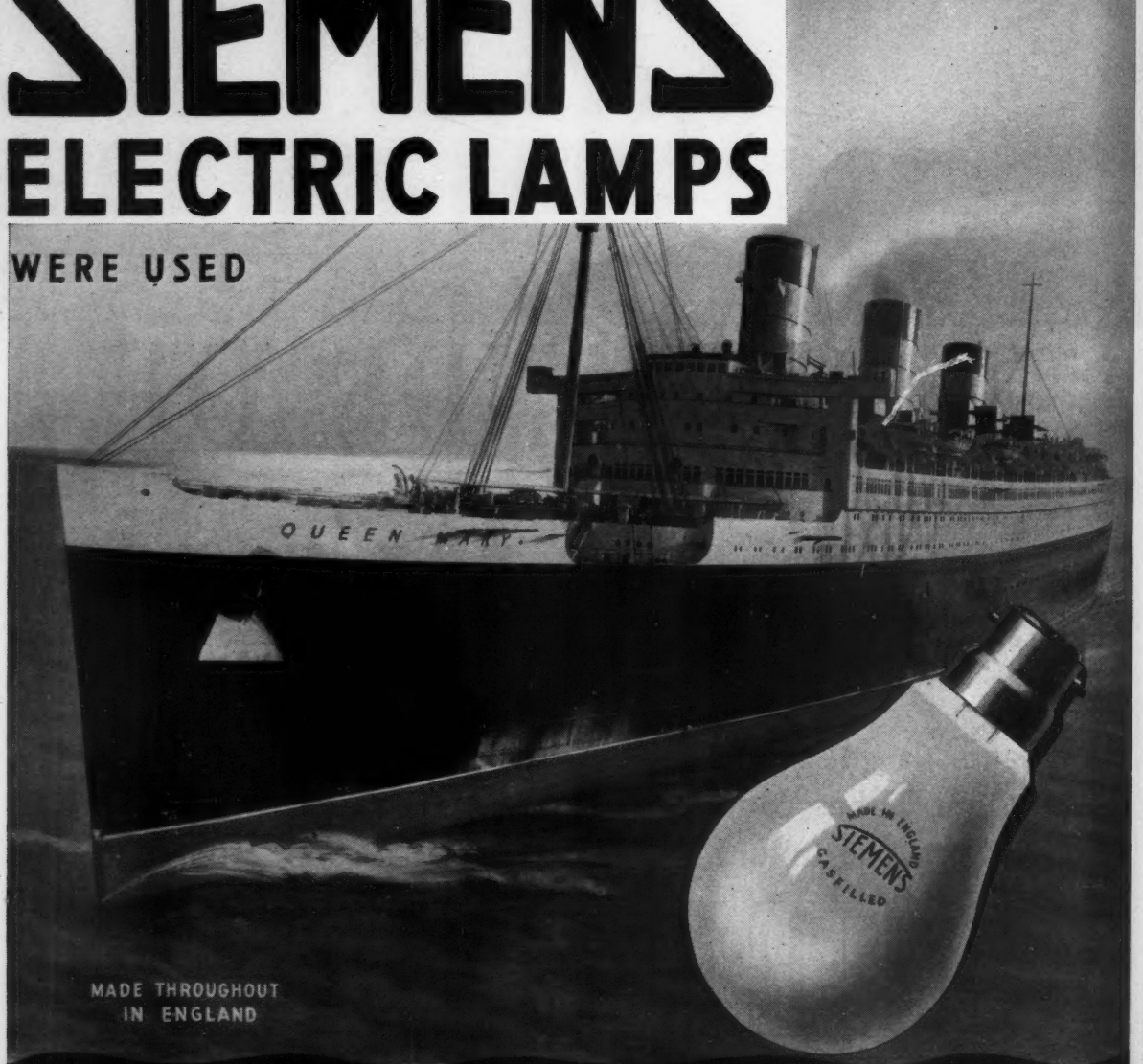

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Light and Lighting

Official Journal of the Illuminating Engineering Society.

32, Victoria St., London, S.W.1.

Edited by J. STEWART DOW

Telephone: Victoria 5215

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June, 1936

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Fittings and Fashion

ARCHITECTURAL lighting in modern buildings is now well established. It may take the form of concealed lighting—no visible fittings, attention devoted to the *effect* of lighting only, *not the implements ;* or it may involve the creation of new designs of fittings in glass, tubes, and glittering metal which are not unobtrusive but direct attention to themselves as lighting fittings and also as elements in the decorative scheme.

Thus we have fittings that conceal themselves and fittings that still assert themselves as lighting fittings.

We now seem to be entering on a new phase. Some of the very latest fittings assert themselves, but seem to deny that they are lighting fittings. Often highly coloured and arresting in shape and contour, they are primarily decorations with lamps attached or concealed in them.

The drawback—if it is a drawback—to such highly original and arresting modern devices is that the eye, at first fascinated, soon wearies of them.

But no matter. Fittings, like dresses, must be subject to Fashion—and it is all Good for Trade.

I.E.S. Annual Meeting—Integrating Cubes and Polar Curve Photometers—Lights on Vehicles Order—Lighting of Hornsey Town Hall—Accuracies of Lamp Filaments—Floodlighting in the Royal Parks—Light in the Theatre.

I.E.S. Annual Meeting

The session of the Illuminating Engineering Society came to an end with the holding of the Annual Meeting on May 12. The president had an excellent record to present—substantial increases in membership—separate Transactions and an improved journal—a local centre in full swing in Manchester and others projected in Glasgow and Dublin—the first special section (on Photometry) launched and others in preparation—the introduction of informal meetings—the first steps towards a library—not at all a bad showing for one session, surely one of the most active the Society has had! The usual practice of inviting a well-known illuminating engineer from abroad to deliver an address at the conclusion of formal business was adopted, the lecturer on this occasion being Dr. Merry Cohu, of Paris, who gave a detailed account of his researches on road surfaces in relation to street lighting. In addition, Dr. Cohu showed a series of lantern slides of some recent lighting installations in France, including some unusual applications of luminous tubes on the Paris underground railways.

Integrating Cubes and Polar Curve Photometers

At the second meeting of the I.E.S. Photometric Section, held at the Westminster Technical Institute on April 28, integrating cubes and polar curve apparatus held the field. We give elsewhere summaries of the two papers. Lieut.-Col. Kenelm Edgcumbe's paper had special reference to his ingenious method of compensating for the effect of "foreign bodies" in the cube which makes possible quite reasonable dimensions, and Mr. A. R. McGibbon and Mr. P. C. Sugg described a special form of apparatus for taking polar curves of gas lamps which had several interesting features. There was a good attendance and an animated discussion. The meeting, in fact, well served its purpose of giving experts on photometry a chance of comparing notes on knotty points.

Lights on Vehicles Order

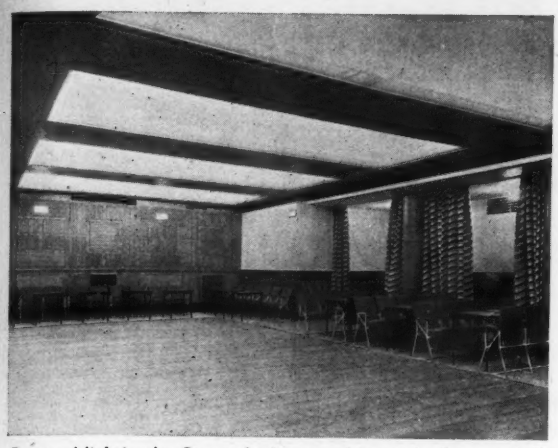
Some important principles are established in the Road Vehicles Lighting Regulations (1936) recently issued by the Minister of Transport, which in general are to come into operation in October next. The most novel and important clauses are those designed to diminish glare. Evidently the authorities have pinned their faith to methods of deflecting or dimming lights as occasion demands; beams may be permanently directed downwards so as to be "incapable of dazzling" a person 25 ft. distant from the lamp whose eye-level is not less than 3 ft. 6 in. above the horizontal plane on which he and the vehicle stand; or they may be such that they can, at will, be deflected downwards and/or to the left in such a way as to be incapable of dazzling; or they may be extinguished so as to leave only a beam complying with the condition indicated above. This regulation, however, does not apply to a lamp fitted with an electric bulb, the power of which does not exceed 7 watts and which is fitted with "frosted glass or other material which has the effect of diffusing the light." (On and after October 4 the wattage is to be indelibly marked on all bulbs used in headlights.) It is evident that these regulations leave a great deal to the discretion in determining what is meant by "incapable of dazzling," though one can sympathise with the difficulty evidently experienced in precisely defining glare—a problem which has puzzled more erudite people than police officers! We notice that cyclists must now carry a white surface of specified dimensions at the rear as well as the usual red reflector. Hand-drawn vehicles of specified small dimensions are not called upon to show any lights. Apparently, too, the pedestrian may still use the roads unilluminated.

Illuminating Engineering Society.

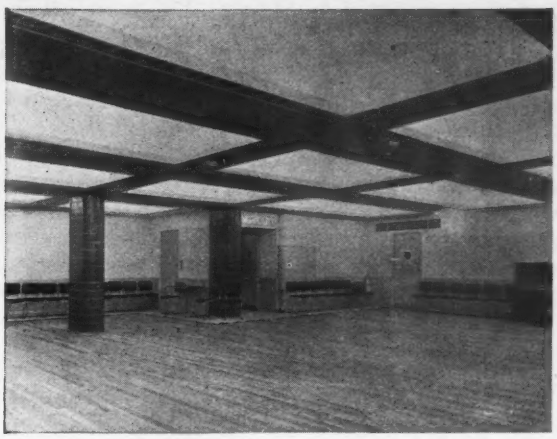
Opening Meeting of Next Session.

The **Opening Meeting** of the Illuminating Engineering Society for the **Session 1936-37,** has been provisionally fixed for **Tuesday, October 13th, 1936,** when, as usual, the **Presidential Address** will be delivered and there will be a **Display Illustrating Progress in Illuminating Engineering.**

Enterprising Lighting at Hornsey Town Hall



Recessed lighting by Osram Architectural Lamps in the main hall at Hornsey Town Hall.

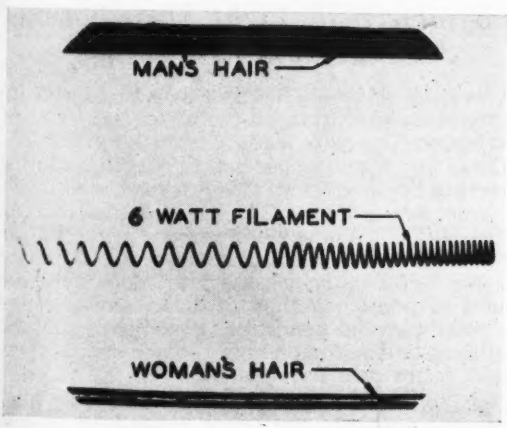


Another public room at the Hornsey Town Hall, in which concealed lighting is again provided.

The new Town Hall at Hornsey, erected to the design of Mr. R. H. Uren, A.R.I.B.A., which was officially opened by the Duke of Kent towards the end of last year, is regarded as one of London's most modern administrative centres. The general equipment is up to date and the artificial lighting installed of a distinctive and modern character. Osram architectural lighting figures to advantage in many sections of this building—notably in the large dance hall and in a number of the smaller dance halls and rooms let out for entertainment purposes. In all, some 700 ft. of such lamps are used. A novel application of this form of lighting, built into the brickwork, is a feature of the foyer entrance, and the main entrance is also artistically treated. The electrical contractors were Messrs. B. French, Ltd. (London).

Accuracies of Lamp Filaments

In discussing the refinements of high-grade lamp manufacture, one of the overseas members of the Illuminating Engineering Society, Dr. S. G. Hibben, recently remarked that if tungsten wire for lamp filaments was as irregular in diameter as the human hair there could be no dependability put upon the uniformity of lamp performance. The average female hair is about one-half of the diameter of the male hair. By comparison, the diameter of the tungsten filament wire used in a 5-watt lamp is on the order of one-tenth that of the female hair and is drawn down or reduced by etching to a diameter of about one-half of a thousandth of an inch. When this wire filament is coiled into the helix the outside diameter of the coil is about that of the male hair. The fact that this filament wire is permitted to vary in cross section by not more than twenty-five parts in a million illustrates the superior refinements that have been achieved in a commercial product.



Surface Colours of Roads

The success of any national scheme of floodlighting the roadways of Great Britain depends materially on the nature of the surface. A more or less polished surface is not necessarily an objection, but it is desirable that the surface should be of a light tint. In this connection we notice that "Municipal Engineering" refers to the good qualities of a new material, a main ingredient in which is Mountsorrel pink granite. Road surfaces thus treated are described as grey with a strong pinkish cast, and as being rough with sharp points, ridges, and projections. The latter quality is considered good in assisting tyres to keep a grip on the road, and it should also be of some value in facilitating the production of a uniform brightness effect.

Floodlighting in the Royal Parks?

It has often been urged that more should be done to promote the enjoyment of the Royal Parks by night—that lighted cafés should line the lakes and music and dancing on the grass should be usual during the summer, as is customary in Continental parks. According to statements in the daily Press, substantial steps in this direction are now to be taken. Catering is to be placed under the control of a single firm and music at meals will be one of the innovations. A café at the Serpentine Lido is projected, and permission for dancing and cabaret in the Royal Parks is being sought. If this is permitted, floodlighting will surely follow.

Light in The Theatre

The British Drama League Exhibition

Enthusiasts for the theatre had recently an opportunity for viewing a notable exhibition of "Modern Scenic Design," devised by the British Drama League in co-operation with the "National Theatre" Appeal Committee.

It consisted of photographs, original drawings, and designs for costumes and scenic sets; and some seventy small models of sets, mostly by British designers, made mainly for various repertory theatres; and some of them from art schools.

Lighting is now fully recognised as important for its own sake, having extended its role beyond that merely of the illuminant of actor and scenery. There was not much evidence of this recognition, however, in this particular exhibition. Too many scenic designers are pre-occupied with materials; others with certain psychological aims; and most are frankly expressing themselves as pictorial painters struggling with a factual third dimension, in which moving blobs of colour will persist in disturbing their harmony of composition.

W. Plummer had one scene ("Aladdin": Emperor's Palace) where coloured light changes were indicated to procure invisibility of the palace and then its sudden appearance. D. Foulkes had a set for "Saint Joan," all white, permitting variable colour emphasis during the play. "Richard II." allied poor workmanship to a better stage sense, in a permanent set "with various places for acting," and dependent on lighting "to indicate the rather formal static nature of the play."

Gordon Craig's model for "King Lear" was shown dimly lit in the "Heath Scene"; but the set revealing most grasp of modern usage of light was the permanent set constructed by R. Southern for the play "Examinations." Here, nine scenes were combined by slight structural variations, with the spectators' attention focused psychologically by use of spot lights directed in turn to each section.

In general, there was a lack of imaginative or romantic design, with a marked preference for heavy realism, and consequent failure to utilise the potent aid of dynamic illumination as a legitimate dramatic effect. Mere absence of light does not in itself provoke "mystery" any more than full illumination implies gaiety. Very few sets carried figures, yet it is not possible to get a complete effect without the actors being indicated. W. G. R.

The Notre Dame Passion Play

A feature of the Paris Fêtes at the end of May and the beginning of June is the open-air performance of a Passion Play in the vicinity of Notre Dame. Special care has this year been devoted to the artificial lighting. Flood lamps and skilfully concealed microphones have been installed at various points outside the building. The ease with which artificial lighting can now be installed does seem to favour open-air dramatic performances — even in the capricious British climate. That such methods can be continuously applied for quite long periods in London was shown by the success of the open-air theatre in Regent's Park last year.

Lighting on the "Stirling Castle"

The Cabin Class Dining Room Saloon on the R.M.M.V. "Stirling Castle," the highest powered motor vessel in the world. Over 10,000 Mazda lamps are installed throughout this liner. Tubular lamps in various shapes, sizes and colours are extensively used, and there is some very effective indirect lighting.

A "Problem Night" in Australia

We see that at a recent meeting of the Victoria Division of the Illuminating Engineering Society in Australia the plan of devoting an evening to various problems in illumination was followed. Amongst the topics discussed were "Illuminated Transparencies," "The Floodlighting of a Cabaret Dance Floor," and "Lighting a Large Private Garden." Regret was expressed by the President that Mr. L. J. Robertson was leaving Victoria and would not be able to continue his active work with the Society.

Symmetrical Light Distributions from Lighting Fittings

A revised edition (B.S.S. 398-1936) of the British Standard Specification on the above subject has just been issued. The steps leading to this specification were outlined in a recent paper before the Illuminating Engineering Society by Mr. H. Buckley, who explained the great importance of such a classification of light distributions. Whilst nowadays the "light flux method" of calculating illumination is widely used, and it is not usually necessary to adopt the laborious "point to point" method of direct calculation from the polar curve, a general knowledge of such curves is still essential, for on this the selection of spacing height ratios primarily depends. In the specification now available the distribution of flux corresponding to direct, indirect, and other conditions of lighting is defined. In addition, the general shape of the polar curve is specified in terms of the frame ratio (i.e., ratio of its width to height) and appropriate values for the spacing height ratio (assuming a desirable uniformity of 70 per cent. up to 20 foot-candles and 50 per cent. for higher values of illumination) corresponding to various frame ratios are given. It is most desirable that these methods, which are the result of most careful work, should be widely known and adopted, and we hope that leading firms in the lighting industry will obtain the specification and make good use of it.

Recent Improvements in Integrating and Polar Curve Photometers of the Photo-electric Pattern

In what follows we give a summary of the paper on the above subject presented by Lt.-Col. Kenelm Edgcumbe, at the Second Meeting of the Photometric Section of the Illuminating Engineering Society, held at the Westminster Technical Institute, at 7 p.m. on April 28th, 1936.

Integrating Photometers.

The underlying principle of these photometers is well known, i.e., that if a light source is placed inside a whitened enclosure, whether spherical or cube, the illumination at any point on the inside surface will be directly proportional to the total flux emitted by the source. Unfortunately, this simple relationship only holds good if the enclosure is so large in proportion to the dimensions of the light source that a negligible amount of light is absorbed by it or by any other bodies placed inside the enclosure, as the light is reflected from wall to wall. Owing to this limitation, the British Standards Specification for Photometric Integrators lays down the empirical rule that the diameter of the sphere or the side of the cube must not be less than 4½ times the length of the lamp under test. This requirement often involves a very large enclosure indeed; for example, a cube photometer for testing 500-watt lamps would measure at least 3 ft. 6 in. each way; for testing fittings a 10 ft. cube is quite commonly used.

A little thought will show, however, that so long as the amount of light absorption is known, it need not be negligibly small, since allowance for it can then be made.

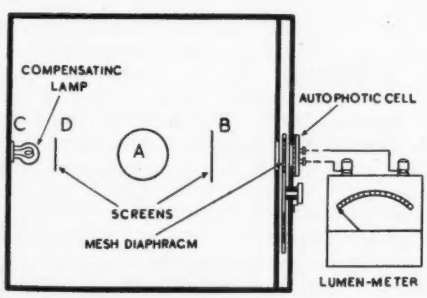


Fig. 1. Showing, diagrammatically, the chief component parts of Integrating Photometer, with Compensating Lamp.

Fig. 1 shows this principle as applied to a photo-electric photometer. The procedure in using the instrument is as follows:—

The sub-standard lamp is put in position in the cube at the point marked "Test Lamp," but is not lit. The auxiliary lamp is switched on and a reading taken on the lumen meter due to light from the auxiliary lamp. Let us suppose that it is 100. The sub-standard lamp is then replaced by the lamp or fitting to be tested (likewise not lit) and a second reading is taken, the voltage at the terminals of the auxiliary lamp being maintained constant. If this second reading is, say, 80, there is evidently an increased obscuration, due to absorption by the lamp or fitting under test. This increase in the proportion of 80 to 100, i.e., 25 per cent., having been determined once for all, the auxiliary lamp can be switched off and the luminous output of the sub-standard lamp and the lamp or fitting to be tested compared in the ordinary way, the value so found being subsequently increased by 25 per cent. to obtain its true value.

Certain precautions are necessary, the chief being that a screen must be placed between the auxiliary lamp and the lamps to be compared so that no direct light falls from the one to the other. If this condition is fulfilled, experience shows that there is hardly any limit to the size of the fitting that can be tested; in fact, the limiting condition is more likely to be the heat emission of the lamp rather than its bulk.

Actually, the compensated cube has an important advantage as compared with the alternative of a larger cube, in that the higher output lamps can be handled without at the same time interfering with the usefulness of the integrator for the measurement of smaller lamps. This is particularly important in the case of photo-electric photometers, since the larger the size of the enclosure, the lower will be the illumination on the cell for a given luminous output, or, conversely, the higher will be the minimum luminous output which can be dealt with.

Fig. 2. A Compact Form of Integrating Cube.

A few figures as to the value of the corrections to be expected may be of interest. Taking a 28-in. cube, the correction for a vacuum or gas-filled lamp may range from zero up to, say, 12 per cent. according to wattage, pattern, age, etc. A 12-in. reflector fitting was found to entail a correction of some 50 per cent., and a 6-in. opal globe of 25 per cent. These figures show how dangerous it is to assume that the obscuration is negligible, and how important it is in all cases to predetermine the necessary correction by the method described. It is obvious that when a

number of similar lamps or fittings are to be tested, the correction can be determined once for all, and then applied to each reading as obtained. Fig. 2 shows one of these compact cubes.

Polar-Curve Photometers.

Although for very many purposes it is the total luminous flux output that has to be measured, modern requirements, particularly for street lighting purposes, are such as to call for the accurate determination of the light flux distribution, in order that a curve may be plotted to polar co-ordinates. So long as the visual method had to be employed, it was usual either to rotate the light source round a 45° mirror carried at the end of the photometer bench, or else to keep the light source fixed and to rotate round it two mirrors, one attached to a long arm, and thus project the rays of light along the photometer bench.

The perfecting of the photo-electric cell has enormously simplified this problem, not only in the direction of increased speed of operation, but also in that of greater accuracy, owing to the ease with which the photo-electric cell may be swung round the lamp under test.

Owing to the size of modern fittings, say, up to three feet in diameter, it is not normally possible to keep the photo-electric cell far enough away from the light source without interposing a mirror in the path. Fig. 3 shows a convenient arrangement. The mirror is 2 ft. 6 in. in diameter, and the total path of the rays 13 ft. The "autophotic" cell is of the rectifier pattern, and is contained in the circular housing shown. The candle-power meter is seen on the right, and consists of a sensitive moving-coil movement with an internally illuminated scale. Fittings up to three feet in diameter can be dealt with, and there are three candle-power ranges, 0-200, 0-1,000, and 0-5,000. A scale of degrees is provided at the end of the horizontal arm round which the autophotic cell rotates and a "click" action enables the operator to turn the arm through exactly five degrees at a time without looking at the scale. A single operator can thus take a whole series of readings in a very short time.

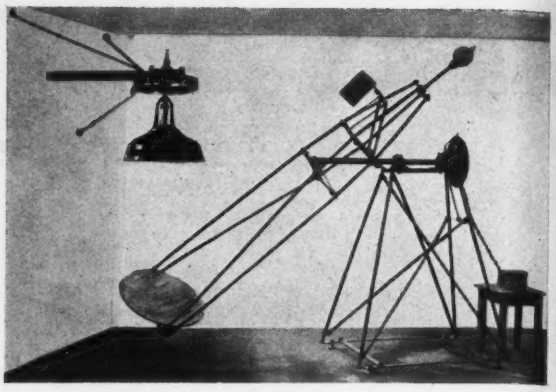


Fig. 3. A convenient form of Polar Co-ordinate Photo-electric Photometer.

The method of supporting the lamp under test is important. Provision must be made for raising or lowering it, since it is essential that the light centre should be in line with the axis about which the mirror and cell rotate, and, further, it must be possible to rotate the lamp itself round a vertical axis so that the distribution curve may be determined in any desired vertical plane. The lamp support with a bold degree scale will be seen attached to the wall on the left-hand side.

In order to control the accuracy of the indications of such a photometer, a lamp of known candle-power is placed in the position of the fitting under test, and a reading on the candle-power meter taken and corrected, should this be necessary, by means of the magnetic shunt provided. By this means allowance is automatically made for any loss of light due to absorption by the mirror or other cause.

Some Topics of Discussion

In the discussion following the reading of Lt.-Col. Kenelm Edgcumbe's paper and that by Mr. A. R. McGibbon and Mr. P. C. Sugg (see pp. 169-171), a number of interesting points were raised. Several speakers inquired regarding the constancy of performance of the photo-electric cells, and reassuring evidence was quoted by Mr. T. Wilkie, who had come up from Leicester for the meeting, and who stated that in his laboratory the effect of temperature on the operation of the cells had proved to be practically negligible. Professor J. T. McGregor Morris made inquiries in regard to the ventilation of integrating cubes, and described an arrangement of shutters which had been adopted at Queen Mary College for this purpose. It appeared, however, that the tests he was concerned in involved the comparison of an arc lamp with a high-pressure gas lamp, and were of a somewhat exacting nature—it was felt that whilst a cube of moderate dimensions might answer for a great variety of sources the effect of enclosure on the candle-power of a high-pressure gas might well be noticeable! The importance of constancy in the reflecting power of materials used to line the integrating cube was also emphasised. Mr. H. Buckley rather alarmed the audience by an account of a sphere the performance of which seemed to vary with the weather—but he explained that only very abnormal wet conditions were likely to affect the reflecting power of the white inner surface to any appreciable degree.

Several queries, from Mr. E. Stroud, Mr. J. S. Dow, and others, were directed towards getting some idea of the degree of accuracy attainable with cubes of specified size and with different types of sources. It was asked, for example, how far a cube could be trusted for a very asymmetric unit furnishing what was virtually a beam in one direction? Lt.-Col. Kenelm Edgcumbe, while admitting that such extreme cases did present some difficulty, explained that the cubical form of enclosure could be relied upon for all ordinary purposes, and pointed out that, even with a sphere of large dimensions, the "compensating lamp" device was useful in that it not only made it possible for errors due to foreign bodies to be largely eliminated, but also enabled the extent of such errors to be determined.

In regard to polar curve apparatus, some speakers referred to the dangers of lack of rigidity in supporting bars, which might cause errors in the angular positions of mirrors. The advantages of the exceptionally robust construction of the apparatus described by Mr. A. R. McGibbon and Mr. P. C. Sugg in this respect were emphasised. The need for care in guarding against distortion of mirrors—and particularly any tendency to become curved instead of flat, was also mentioned.

Mr. McGibbon, in replying to the discussion, also explained the circumstances that had led to the adoption of electric filament lamps as sub-standards, whilst admitting that constancy of voltage and correct regulation were of great importance when such lamps were compared with gas lamps.

Although the audience was not quite so big as on the occasion of the opening meeting, the response and keenness shown at this second gathering was considered very encouraging. We understand that several very interesting items for next session have already been arranged.

Photometric Apparatus for Lamp Testing

A summary of a paper read by Mr. A. R. McGibbon and Mr. P. C. Sugg, at the meeting of the Photometric Section of the Illuminating Engineering Society, on April 28th, 1936.

A general view of the laboratory with which the authors are associated (that of Messrs. Wm. Sugg and Co., Ltd.,) is shown in Fig. 1, in which the separation of the photometric dark room from the rest of the laboratory by means of curtains is seen. A feature in the laboratory is the mirror head (see Figs. 4-7) which is interposed between the test lamp and the photometer bench. This receives light from the lamp at any desired angle and redirects it axially into the photometer head, where the candle-power is measured by comparison with a uniplanar electric filament lamp of known value. Gas supply is available from a small holder, or at mains (about 4″ w.g.) pressure or from a compressor (80″ w.g.). Meters and constant pressure governors are conveniently situated at a side bench adjacent to the test lamp. Other equipment includes a calorimetric bench for checking the quality of gas, and a photographic dark room.

A suspension type lamp can be mounted on a small crane, which serves to bring the light source into the precise position for test. The lamp is locked rigidly on to a rotatable head provided with a 0°—360° protractor, which moves under an illuminated index. Gas connection is made through a mercury seal, and pressure is indicated on a gauge mounted on the arm. In the case of a lamp designed to fit directly onto the spigot of a column, use is made of a vertical steel guide on which slides a cast iron arm adjustable for height by means of a lead screw and handle (Fig. 2). The whole arm may be swung sideways when not in use.

The use of the mirror head to redirect the light from the test lamp, which retains its vertical position throughout, is illustrated in Fig. 3, where the path of the ray of light reflected by a system of three flat mirrors is traced. This system of mirrors is rotated round the test lamp about an axis passing through the light centre. The method of supporting the mirror head on a ribbed cast iron base frame, running on rails, is shown in Fig. 4. The mirror head can be easily removed when the lamp is being set up for test

The distance travelled by the light in passing through the head is 11 ft.—an extra distance which is of value in testing large sources, as a total distance from test lamp to photometer head of 20 to 30 ft. can

Fig. 1. General View of the Laboratory, the Photometric Section. The Photometric Dark Room is separated by means of curtains and blinds, which are drawn only when required.

be obtained with ease. The appearance of a test lamp viewed through the mirror head is shown in Fig. 5 (the lamp is, of course, actually vertical). Screens of suitable aperture prevent reflections of light from

Fig. 2. Method of mounting lamp vertically on projecting arm.

the frame of the mirror head striking the photometer. Apart from its photometric value, the apparatus thus serves a useful purpose in demonstrating

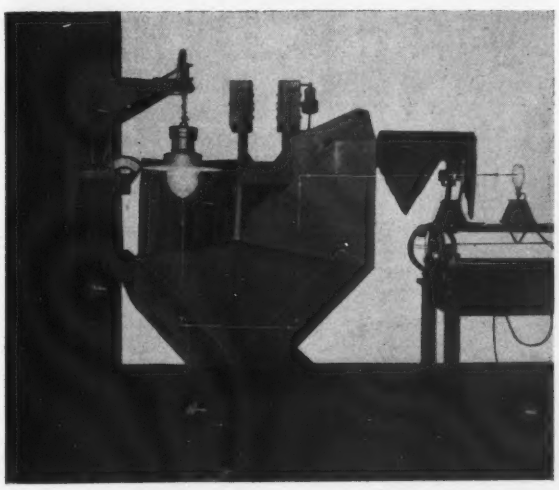


Fig. 3. Showing Path of Light and arrangement of the mirrors.

Fig. 4. Showing the mounting on the Mirror Head.

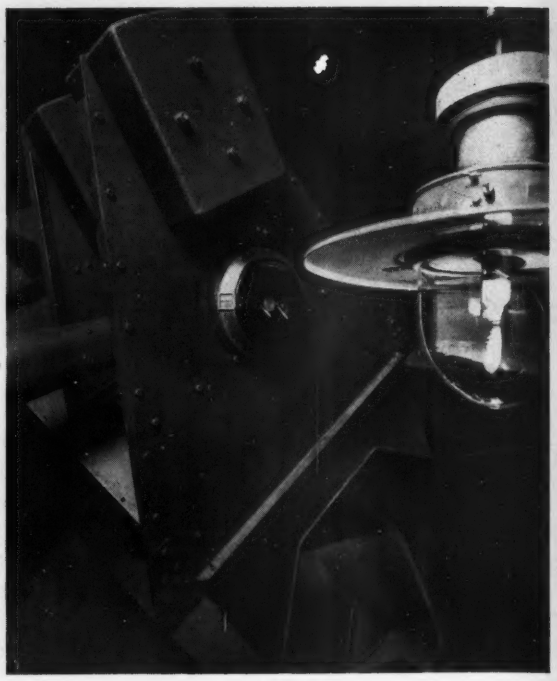


Fig. 6. The apparatus is set to view the lamp at 75°, the angle being indicated on protractor at side.

the appearance of a lamp when viewed from any desired angle. (A screen has been removed in order to give a clearer view of the interior.)

In Fig. 5 the apparatus is seen set at an angle of 75°. The angle is indicated on the protractor, which moves under the stationary index. Two spring-loaded detents engage alternatively at 5° intervals, or at the Russell angles. The small levers engage the required detent. It is evident from Fig. 7 that the limits of rotation of the mirror head suffice to accommodate all normal distributions. This particular apparatus is in use at the Manchester Corporation Gas Department Laboratory.

The final illustration (Fig. 8) shows a simpler form of mirror-head suitable for certain applications. A single flat mirror swings round the test lamp on a counter-balanced arm, mounted on a ball-bearing trunnion coaxial with the test lamp and photometer head. The mirror arm and suspension crane here form one complete unit. A removable screen prevents light entering the photometer head directly from the test lamp. Here again the five-interval and Russell-angle automatic location is provided. The angle of the mirror relative to the arm can be adjusted by means of a fine-thread screw to suit different distances between photometer head and test lamp.

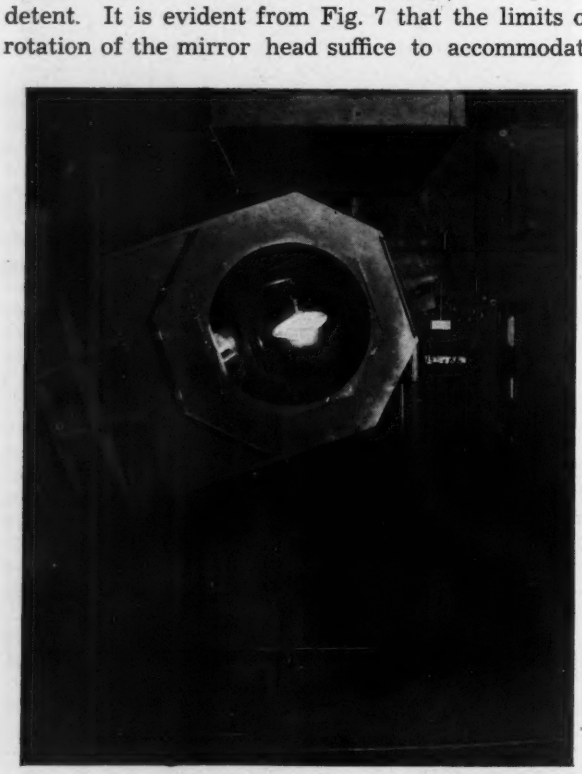


Fig. 5. Showing appearance of Test Lamp viewed through Mirror Head.

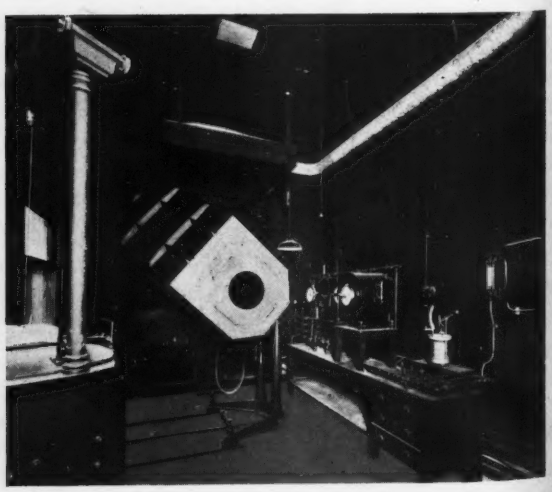


Fig. 7. Showing rotation of Mirror Head.

Colour-corrected screens are used in conjunction with electric comparison lamps in order to avoid colour-differences in the photometer head, which is of the Lummer Brodhun Contrast pattern. Hoods are furnished to ensure that the eyes of the user of the photometer are screened from possible glare from the test lamp or comparison lamp. The comparison lamp—frequently of the 20-candlepower 100-volt "uniplanar" type—is mounted on a rubber anti-vibration pad on the moveable carriage. Current taken from the mains is passed through a barreter stabiliser to ensure a steady voltage. An endless graduated steel tape, attached to the carriage, moves under an illuminated index beneath the operator's eyes, so that the distance of the comparison lamp from the photometer head can be read at a glance. In practice the candlepower of the source is quickly calculated from this reading, and with this type of apparatus a complete test of an asymmetric street lighting fitting can be taken in three-quarters of an hour.

In conclusion, the authors expressed their thanks to the South Metropolitan Gas Company, Ltd., the Manchester Corporation Gas Department, and Messrs. William Sugg and Co., Ltd., for permission to take the photographs shown at the meeting.

Fig. 8. A Mirror Head of somewhat simpler form.

Some New Applications of Artificial Light Control

A number of illustrations of the extending applications of systems of artificial light control, based on the use of selenium cells, were given at a recent meeting of the Illuminating Engineering Society. Their applications for counting mechanisms and for street lighting control are familiar. The latter, however, seems to be entering on a new phase because of the growing feeling that "half-night lighting" is not an expedient economy. Some districts where this method is being applied seem likely to go over to all-night lighting. In any case a system that automatically brings the light on when daylight fails (for instance, through a temporary fog) is obviously an advantage from the safety standpoint—the more so because such conditions are apt to develop suddenly when dusk is approaching in winter and when traffic is at the peak.

Amongst the newer applications of the system are the control of traffic bollard lighting on traffic islands and of the larger directional signs, and the automatic switching on and off of aerodrome lighting. The use of the system to control large illuminated advertisement signs is, of course, familiar, and in offices and works automatic control by the Radiovisor system, which is understood to be extending rapidly, has been used for some time. One recent installation, for controlling the lighting of staircases in a large block of flats, does, however, seem to be a new departure.

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"LUX"

(La Revue de l'Eclairage)

WE have pleasure in announcing to our readers that we have entered into an arrangement to receive subscriptions for the French Journal "Lux" (La Revue de l'Eclairage). The subscription per annum is 30 francs, the approximate equivalent of which in English money is Seven Shillings and Sixpence (7/6).

"Lux" is the only French journal which specialises in all aspects of lighting; it is the official organ of the Association Française des Ingenieurs de l'Eclairage (equivalent to the Illuminating Engineering Society in France).

It furnishes a complete record of interesting developments in lighting in France and on the Continent. It is fully illustrated and in particular devotes a considerable number of its pages to Decorative Lighting.

By studying these articles and the numerous photographic reproductions of modern lighting installations the reader can readily gain an excellent impression of French methods and practice in matters of Illumination.

Applications for subscriptions will be received by "Light and Lighting," 32, Victoria Street, London. S.W.1.

A Combined Heating and Lighting Unit of Novel Design

We are indebted to Mr. Leonard J. Beard for the adjacent view of a novel type of fitting, designed from his sketch and manufactured by the General Electric Company, Ltd., for an installation in Essex, in order to meet somewhat special conditions.

The illustration shows a small loggia, the heating of which presented some difficulty. Wall panel heaters could not be effectively installed, as no convenient space could be found at a low level without altering the layout of the furniture; whilst if placed above the furniture level the source of heat would have been in a direct line with the head of anyone using the room. Portable heaters were not desired.

Eventually, a ceiling fitting was constructed with four Flecta bars in the form of a square, and at an angle of 45° to the vertical plane. An asbestos chamber was built within the square, and was glazed with obscured and rippled glass. Within this space was placed a 100-watt lamp, thus providing an additional method of lighting and serving to relieve the "heaviness" of the fitting. Three switches are provided in the skirting, two operating the bars in opposite pairs, and one on the lighting. The general lines of the fitment are carried out to match the emblique brackets already in use.

The ceiling is cut away immediately above the fitting, giving access to a lean-to roof. The ample space there available allows good dissipation of the back heat from the reflectors.

A Novel Type of Ceiling Fitting furnishing both Light and Heat.

The Man in the Street—and His Views on its Lighting

At a meeting of the North-Western Centre of the Illuminating Engineering Society, held in Manchester on February 18, Mr. R. Maxted gave an account of his "subjective" methods of treating lighting problems —a topic on which, it will be recalled, he lectured to the Association of Public Lighting Engineers in September last.

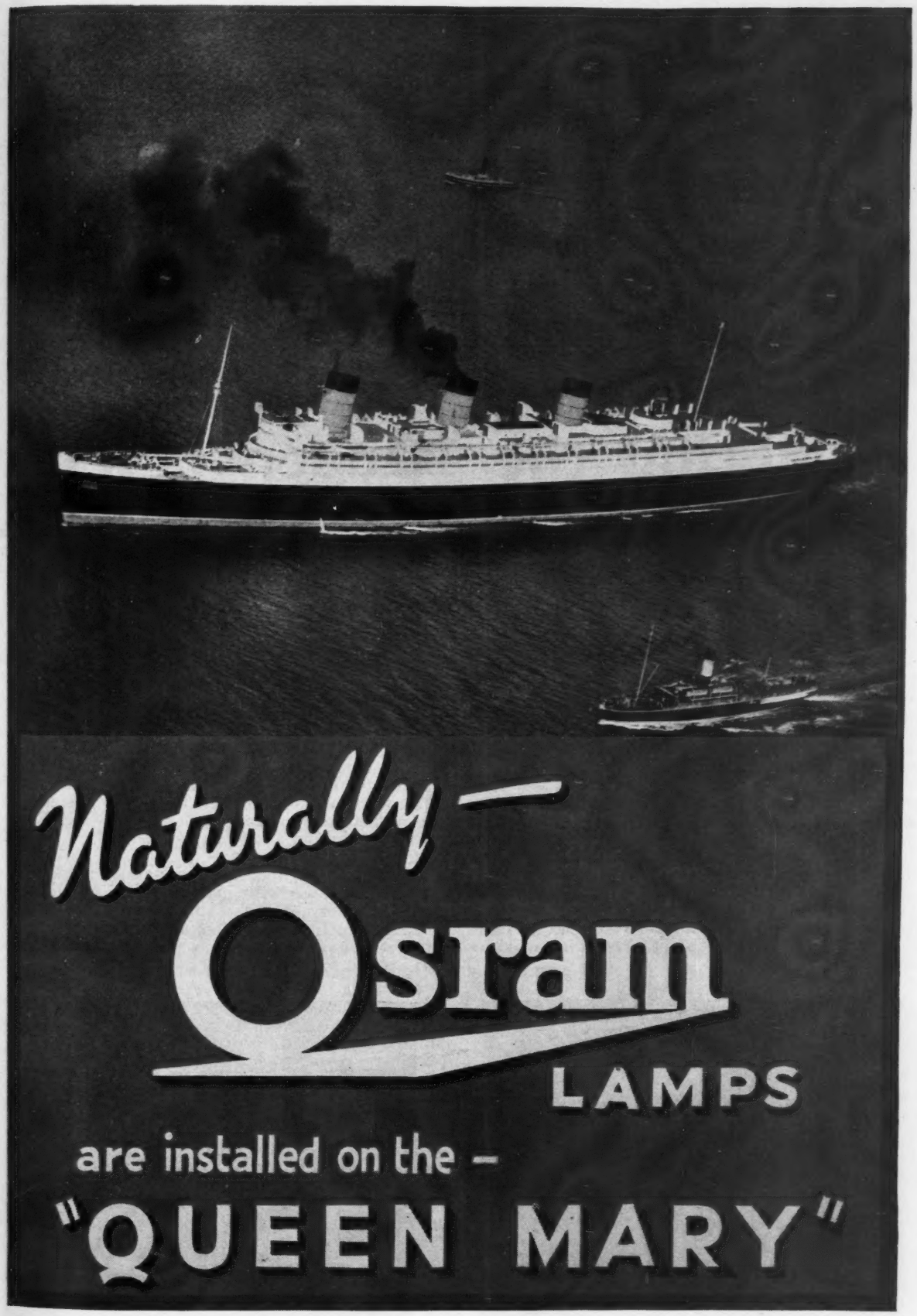
Mr. Maxted pointed out that every engineering problem has two main aspects. The first of these is the determination of the results required. The second—and often the more spectacular—is that of satisfying the desired conditions. There is perhaps a certain tendency to concentrate mainly on the second aspect—though in fact the determination of the desirable conditions is often not so easy for the illuminating engineer, for the issue is not governed simply by considerations of an engineering nature, but by the claims of the human "seeing machine." This apparatus, moreover, is not entirely visual. Psychological elements enter into the problem which in general consists in the distribution of brightness over the entire field of view in such a way that distracting and fatiguing effects are avoided, and the attention of the user is naturally drawn to vital points.

This applies particularly to street lighting, where the problem of determining and specifying "effectiveness" of lighting is of great importance. The authors have been experimenting with the "subjective method" which consists in determining and recording the mental impressions gained by observers in the streets. In the experiment described each observer was given an instruction sheet and a test sheet; he was asked to record his impressions of each section of the roadway traversed, and to place them in order of merit. It was thought expedient to select observers who were interested in street lighting only as road users, and to avoid all technical terms (such as visibility, brightness, etc.). Groups of at least ten and preferably twenty observers were preferred, and in general not more than six installations were compared.

The actual results obtained from the method are promising. A subjective test of this kind may, for example, reveal that some section is placed very low on the list; then if the lighting conditions are modified a repeat test may show whether, in the popular view, an improvement has been effected.

Various interesting points were raised in the discussion. In reply to an inquiry by Mr. Sellars, Mr. Maxted agreed that a consistent degree of glare was preferable to intermittent glare, such as might arise from an injudicious "cut-off" angle. Fairly consistent results had been obtained from tests in Rugby, Birmingham, and Wolverhampton in one night. But it was less certain how accurately comparisons would apply in the case of tests in places so far distant as, say, London and Manchester. Order of view was, no doubt, a point of importance; in these tests, however, routes without extremes of lighting were selected, and the eyes were kept fairly well adapted to average street lighting conditions during the tests.

It was agreed that, whilst tests so far had related to people with average eyesight, impressions of those with very poor vision, in order to determine minimum conditions, might be of importance. The wearing of glasses had doubtless an effect, especially if the glasses were not clear and the installation somewhat glaring.



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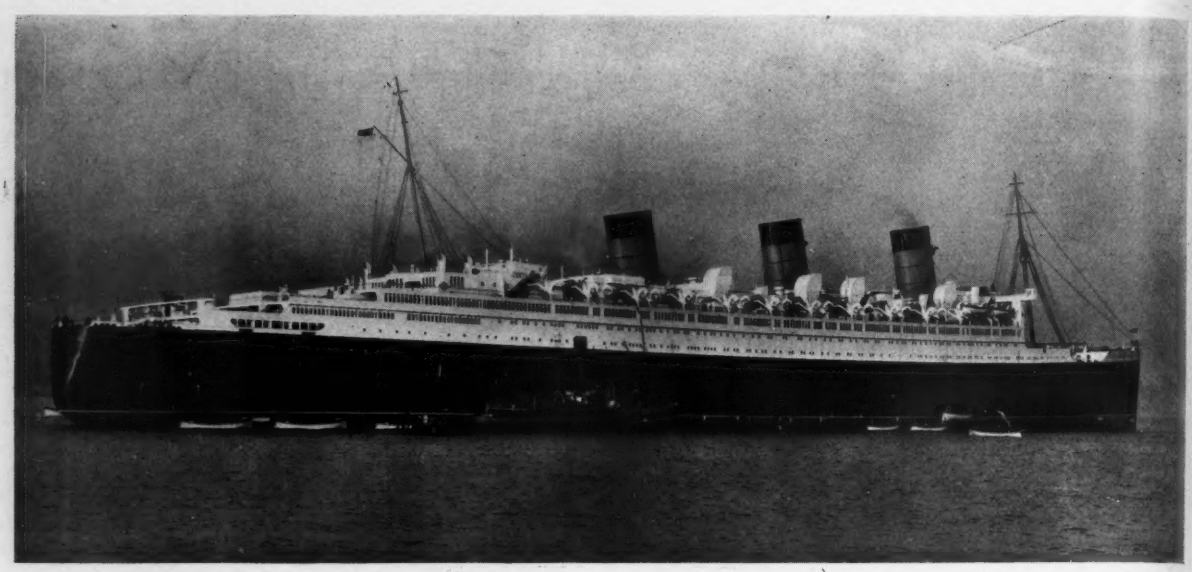


Lighting the "Queen Mary"

NAMED after Royalty, launched by a Queen, visited by the King, the new Cunard-White Star liner Queen Mary may rightly be said to maintain her royal rank in the distinction of her general equipment, which suggests the best type of luxury—beauty and skill applied to useful ends.

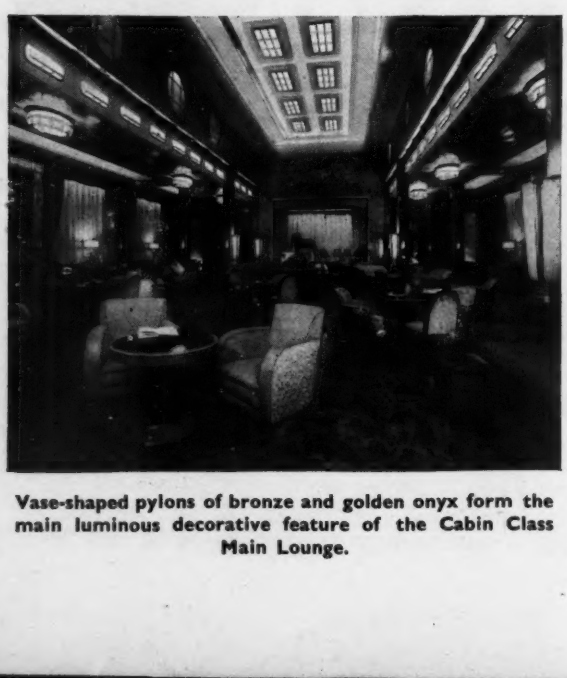
In mere size, of course, she is impressive—her length overall, for example, being practically equal to the height of the Eiffel Tower, and her height from keel to funnels exceeding that of St. Paul's Cathedral; through one of her funnels three modern locomotives could run abreast with ample "permanent way" between them. One of her promenade decks is 750 feet long; her first-class restaurant is 160 feet long and 118 feet wide—the whole width of the ship. Many other dimensions might be given, but these will suffice to show that the building, launching and fitting up of such a ship is proof of the traditional repute of British designers, engineers, and workmen.

Especially is this true of the internal equipment. The beauty of the ship's interior and the outstanding measure of comfort provided have entailed the careful consideration and satisfactory solution of innumerable problems.

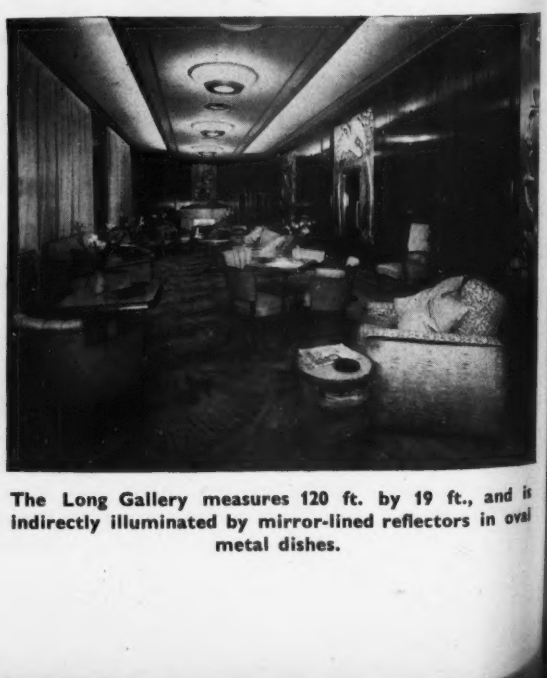
The lighting alone is worth pages to itself, and can truthfully be described as a triumph of modern illuminating science. The success attained is due entirely to the close collaboration of the architects, Mr. Arthur J. Davis, A.R.A., F.R.I.B.A., of Messrs. Mewes and Davis, FF.R.B.A., and Mr. Benjamin W. Morris, F.A.I.A., of Messrs. Morris and O'Connor of New York, and the various decorative contractors with the General Electric Company Ltd., which company was responsible for the lighting of most of the principal pubic rooms.

The lighting fittings in the Cabin Class Rooms were designed in collaboration with Mr. Paul Guieu, under the direction of the architects as mentioned above, whilst those in the Public Rooms in the Tourist Class and Third Class were designed and manufactured in conjunction with the Cunard-White Star, Ltd., and Messrs. John Brown and Co. Ltd.

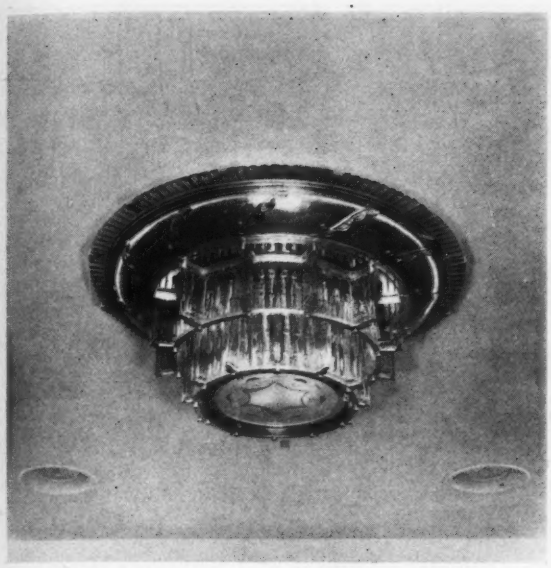
The architects and the illuminating engineers have been confronted with many unusual problems, due to the variety of systems of lighting demanded for suitable application in the various public rooms, and the results obtained are a real triumph for those associated with this work.



Vase-shaped pylons of bronze and golden onyx form the main luminous decorative feature of the Cabin Class Main Lounge.



The Long Gallery measures 120 ft. by 19 ft., and is indirectly illuminated by mirror-lined reflectors in oval metal dishes.



Central Lighting fitting in the Small Tea Room.

Main fitting in the Long Gallery.

Many thousands of electric lamps, naturally, were needed, a large proportion of these being Osram lamps of various types ; by no means all of the kind familiar to the public, for they included lamps for the stage lighting battens and floods, projector lamps for "spot" and special effects, architectural lamps for decorative illumination, lamps for signalling devices, and for dozens of other uses. It is suggestive of the extent of the equipment to learn that the G.E.C. supplied over 200 directional signs, 640 wardrobe lighting units, and 7,000 Roanoid lighting fittings. Incidental to this, was an order for thirty-five gross of switches, in addition to the circuit-breaker, distribution boards for the lighting of crew spaces, connection boxes, and other essential items. The telephone installation of the ship may be reasonably compared to that of a large town exchange with hundreds of subscribers.

CABIN CLASS

The Restaurant

In the Cabin Class Restaurant two imposing torcheres provide the main source of light for the indirect illumination of the important and lofty central area. These are equipped with silvered glass reflectors of a specially designed contour, in which are used Osram projector type lamps. The indirect lighting provided by these is augmented by direct lighting from a series of rectangular fittings forming luminous decorative features, in the high and intermediate level ceilings. These are glazed with artistic moulded glass panels, those on the intermediate level ceiling being surrounded with narrow pink tinted flashed opal panels, with engraved lines forming a deep bevel edging and making a distinctive and charming combination.

Auxiliary decorative lighting is introduced with telling effect in the form of six concealed lighting cornices running fore and aft, which provide bright bands of light for the accentuation of the linear treatment.

The illumination of the area covered by the low level ceiling is derived from trough lights, glazed with moulded and flashed opal glass panels, running fore and aft, and surrounding the funnel hatch, augmented by glazed cornices above the outboard windows, which are also artificially illuminated during the hours of darkness.

Difficulties arising from limitations of height and structural details have been cleverly and successfully overcome by close collaboration between the architect, the fittings designer, and, in fact, all concerned—not forgetting the craftsmen responsible for the production of the actual fittings.

The Lounge, as might be supposed, is one of the most beautiful rooms on the ship, and its lighting, in particular, must be seen to be appreciated at its true value.

The lighting effects in the Cabin Class Main Lounge are calculated to enhance a decorative scheme notable for its delicacy. In the main ceiling fourteen flush laylights, glazed with peach tinted plate glass, worked with sandblast ornament, constitute the main feature.

The surface of the ceiling is directly illuminated by a series of twenty-eight reflector fittings recessed in the frieze.

In addition the ten circular daylight windows are artificially illuminated during the hours of darkness.

The lighting of the Central Area is augmented by eight circular vase-shaped pylons of bronze and golden onyx, which, in addition to their utility as lighting fixtures, form the main luminous decorative features.

On the soffit between the high and low level ceiling, eight oval-shaped ceiling fittings of bronze and glass of distinctive decorative quality are introduced, whilst the low level ceiling contains a series of recessed concealed lighting casettes.

The curtains of the outboard windows are cleverly and effectively illuminated and, in addition, eight gilt and silver bronze floor standards, surmounted by choice fabric shades, are introduced as additional decorative motifs.

A simple central ceiling fitting illuminates the Children's Playroom in the Queen Mary.

2,160 lamps with a total load of 85 kilowatts are required to light the Queen Mary's magnificent Cabin Class Restaurant.

The Smoke Room

As in other rooms, the illumination of the Cabin Class Smoke Room is a pleasing combination of direct and indirect lighting. The frieze is treated with panels of mirror glass intersected by bronze troughs concealing lamps.

Eight sconce brackets, containing special silvered glass reflectors and lamps, provide the source of indirect illumination for the central area.

On the low level ceiling direct lighting units, incorporating also the ventilation inlet for the air conditioning, are employed. In addition, a series of brackets for the provision of a higher level of local lighting are provided at appropriate positions.

In the Cabin Class Cocktail Bar and Observation Lounge, which is semi-circular in plan, indirect lighting from the ceiling over the Service Bar and the windows is used; there are also five pendants in domed recesses in the main ceiling, relieved with bright coloured bands of cellulose paint and shallow glass central "dishes" having sandblast decoration. Above these are trumpet shaped cone reflectors which also serve to conceal the ventilating ducts.

The illumination of the main ceiling is effected by the use of four indirect lighting standards incorporated with the newel posts of the balustrade.

The Ballroom

The lighting of the Cabin Class Ballroom is admirably conceived to convey a festive atmosphere.

Surrounding the ceiling of the dance area is a continuous coved trough in which concealed wiring channels accommodate lamps for white and three colour lighting. These are controlled by dimmers giving a sequence of colour-changing effects, or alternatively constant lighting in any desired colour. A magnificent white crystal glass fitting of unique design is fixed in the centre of the ceiling, in which clear and coloured lamps are installed. The coloured lamps are controlled by the dimmer operating the other colour changing effects, and in combination with the clear lamps, produce a brilliant feature in the decorative scheme in pleasing harmony with the rest of the lighting. On the ceiling over the balcony on the outboard side, three lay-lights are installed. The centre one, measuring 11 ft. by 4 ft., is flanked by two smaller ones 3 ft. by 3 ft. They are glazed with ¼-inch peach plate glass worked with intricate engraved decoration involving seven processes, the rounded corners and curved sides of the designs also necessitating accurate moulding of double bent glass. They are illuminated by indirect methods, the lamps, concealed along each side, projecting light on to specially shaped sheet metal reflectors recessed in the ceiling above.

Around the dance floor five narrow rectangular troughs glazed to match the above are installed on the ceiling, and the curtains of the outboard windows are illuminated by lamps concealed in a coved trough running fore and aft across the room. Concealed lighting troughs are also provided to illuminate the windows at night.

The Long Gallery

The irregular spacing necessary owing to the construction of the Long Gallery—which measures 120 ft. by 19 ft.—presented a very difficult problem to the lighting engineers; it was solved, however, with entire satisfaction, and no loss of general symmetry, by the introduction of eight ornamental pylons, four nearer to the wall on the outboard than on the inboard side, and four smaller ones flanking painted panels on the end walls. These are surmounted by mirror-lined reflectors concealed in oval metal dishes, housing Osram lamps of the projector type. Indirect lighting is thus attained, and again the silver bronze scheme has been embodied with undeniable beauty, harmonising well with the prevailing tone of the furnishings. Indirect lighting is also used for the Starboard Gallery; here two continuous troughs with lamps spaced at appropriate intervals run fore and aft along each side of the stepped ceiling, and are supplemented by four circular pendants in silver bronze. These, with amber tinted flashed opal glass, introduce luminous surfaces contrasting with the main indirect lighting, but not unduly interfering with the delicate and restrained impression of the whole idea.

The Swimming Pool

For the indirect illumination of the Swimming Pool, silvered glass GECoRAY reflectors with Osram projector type lamps are housed in faience bowls built into columns on each side; small trough-shaped wall lights give a decorative note, and serve also to counteract any shadows caused by the more powerful rays above. Two other reflectors on the walls fore and aft—making eight in all—complete the equipment here, and as the curved ceiling is lined with imitation mother-of-pearl the whole effect is exceptionally charming.

Cabin Class Swimming Pool.

TOURIST CLASS

From the passenger's point of view, a liner's Tourist Class accommodation may be considered as hardly less important than that of the Cabin Class. The numbers of people travelling "tourist" spread over the life of a ship of the Queen Mary type will reach millions. The equipment of the Tourist Class on the Queen Mary has been designed with an idea of giving pleasure to those who will travel by her in years to come as well as to those who voyage in the immediate future, and this obviously includes the illumination. All the lighting fittings for the public rooms in this class were designed by the G.E.C. in consultation with the Cunard-White Star Furnishing Department. By this means metalwork, lighting and decorative possibilities were brought into harmonious relation. For the fittings, matt finished silver bronze metal was selected, the glazing being of flashed opal glassware chosen for its excellent diffusing characteristics.

A totally indirect lighting system is used in the Cabin Class Cocktail Bar.

Each of the Tourist Public Rooms has its individual appeal, and is treated according to its own requirements.

Tourist Dining Saloon

This room is typical of the vastness of the Queen Mary, being approximately 100 ft. wide by 80 ft. long. On the centre, running fore and aft, are three imposing ceiling units 5 ft. in diameter; the illuminated section is 2 ft. in diameter, housing the necessary lamps, and having a flat ornamental surround divided into two bands, the inner being of white mirror glass with decorative sandblast treatment, and the outer of polished silver bronze, also with sandblast design echoing the treatment of the windows on the port and starboard sides.

On the inboard port and starboard bays are six ceiling fittings similar to those on the centre line, but having a smaller decorative surround, these being 3 ft. 9 in. in diameter.

In the extreme port and starboard bays there are fourteen fittings matching those described above, 2 ft. 6 in. diameter, and, together with thirty-four small trough-shaped soffit fittings, disposed intermediately with the larger fittings, previously described, these provide the main source of illumination with a total of some 200 lamps.

Interesting decorative lighting is given by the phantom illumination of a series of heavy plate glass panels with engraved symbolic designs, fitted in the sideboard recess at the aft end of the Saloon, and also by similar panels forward. The scheme is completed by the concealed lighting of the fifty-four windows at each side of the room by means of reflectors, and the provision of 12-in. diameter ceiling fittings in the Vestibules.

The metalwork throughout is silver bronze with a mat finish, and the glassware used in those fittings, providing effective illumination, is champagne tinted flashed opal with ornamental engraved line treatment.

Luminous glazed cornice in the Tourist Class Cocktail Bar.

Tourist Smoke Room

The Smoke Room is illuminated by 14 direct lighting ceiling fittings in which are incorporated the necessary ventilating inlets. Twelve quadrant-shaped wall lights fitted in the window recesses provide additional local lighting.

At the forward end a map and notice board are illuminated by architectural lamps. The outboard windows are also pleasantly illuminated during the hours of darkness.

Tourist Library and Writing Room

Illumination of the Library is effected primarily by flush panel fittings running parallel with the bookcases on each side of the room. These fittings are in two sizes, 13 ft. by 1 ft., and 4 ft. 2 in. by 1 ft., with special chromium-plated reflectors recessed into the ceiling, and are mainly for lighting the bookcases.

General lighting is furnished by one central ceiling fitting 2 ft. 6 in. in diameter of silver bronze and cellulose finished metalwork with champagne tinted flashed opal glass, together with several small trough shaped ceiling lights.

The Writing Room is illuminated by four rectangular ceiling fittings 3 ft. by 1 ft. 3 in. similar in character to those in "A" Deck Lounge, having provision in the form of horizontal vent louvres for part of the room ventilation.

Additional decorative lighting is provided by concealed reflectors in the nine windows.

Tourist Cocktail Bar

The lighting of the Tourist Cocktail Bar incorporates the use of a continuous luminous cornice glazed with champagne tinted flashed opal glass as the principal lighting feature.

An attractive laylight at the forward end of the room, and an ornamental illuminated mirror and clock dial give an ideal finish to the general scheme.

The entrances and staircases of a ship need good lighting, and on the Queen Mary special attention has been given to this matter. The main and aft entrances and staircases extend through eight of her twelve decks, and each has a different scheme. Special mention may be made of the Main Entrance on the Promenade Deck, which has an enclosed lighting trough 72 ft. long, occupying the central ceiling area. Four circular ceiling fittings 20 in. in diameter are provided on the port and starboard sides. In addition niches in the vestibules hold carved ornamental figures, each of which is illuminated.

In the Tourist Accommodation, as in the Cabin Class, the Queen Mary has a special Children's Playroom. This attractive little apartment is lighted by a simple feature along the centre of the ceiling, the silver bronze metalwork being relieved by bands of colour, and the glass being champagne tinted flashed opal, giving a cosy warm effect

THIRD CLASS

In this section G.E.C. lighting fittings are also used extensively and figure prominently throughout many of the public rooms, such as the Dining Saloon, Smoke Room, Lounges, Deck Entrances, and other Sections.

These were designed by the Fittings Department of the Glasgow branch of the Company in conjunction with the decorative architect of Messrs. John Brown and Co., Ltd., and are constructed of cast silver bronze finished metalwork, glazed with white or white flashed opal glassware. In the garden lounge a number of trough fittings 4 ft. 6 in. long are installed for the main lighting, recessed laylights, being used on the low portion to conform to the curved part of the structure. The Dining Room is illuminated in the main by 58 ceiling fittings with 12 in. diameter glassware. Wall brackets to match are also installed, and several trough shaped brackets 4 ft. long, each arranged for five lamps, are fixed over the mirrors, also three 54-inch recessed lay-lights, each illuminated by six lamps.

Private Dining Room in the Cabin Class.

The Third Class Smoke Room is illuminated by some 43 ceiling fittings with drum-shaped opal glassware, augmented by 36-inch recessed laylights and a number of recessed bracket fittings to suit the shape of the partition. The various deck entrances have different types of ceiling fittings. "C" Deck entrance has 6-inch globe fittings, while the main deck entrance is illuminated by fittings of cylindrical glassware with similar lamp equipment. The "A" Deck entrance has a number of 2-light box fittings, striplite lamps being used for the low positions. In the Annexe ceiling fittings are installed, while the Engineers' Mess is illuminated by small cylindrically shaped ceiling fittings.

A full description of the equipment necessary for the entire lighting scheme of the three classes—Cabin, Tourist, and Third, would occupy many columns. But this summary, which includes some of the principal ideas carried out in the more important parts of the passenger accommodation, may serve to illustrate the scheme in its entirety, and to show that the importance of good lighting has not been overlooked in Britain's premier liner.

G.E.C.

LIGHTING

on the

"QUEEN MARY"

The General Electric Co., Ltd., has been responsible for the lighting schemes and the manufacture and supply of the lighting fittings for the public rooms enumerated below:—

CABIN CLASS	TOURIST	THIRD CLASS
RESTAURANT	DINING SALOON	ANNEXE
PRIVATE DINING ROOMS (Forward)	LOUNGE (Main Deck)	DINING SALOON
MAIN LOUNGE	LOUNGE ("A" Deck)	SMOKE ROOM
BALL ROOM	SMOKE ROOM	GARDEN LOUNGE
SMOKE ROOM	MAIN STAIRCASE	ENTRANCE "A" DECK
FORWARD OBSERVATION LOUNGE AND COCKTAIL BAR	AFT STAIRCASE	ENTRANCE MAIN DECK
LONG GALLERY AND STARBOARD GALLERY	LIBRARY AND WRITING ROOM	ENTRANCE "C" DECK
MAIN LIGHTING EQUIPMENT FOR SWIMMING POOL	COCKTAIL BAR	LOUNGE
	CHILDREN'S PLAYROOM	

The fittings in the Cabin Class were designed by The General Electric Co., Ltd., in collaboration with Mr. Paul Guieu under the direction of the architects, Mr. Arthur J. Davis, A.R.A., F.R.I.B.A., and Mr. Benjamin J. Morris, F.A.I.A., of Messrs. Morris & O'Connor of New York, and the supervision and direction of Mr. J. C. Whipp.

A large quantity of OSRAM LAMPS has been installed throughout the Ship

TELEPHONES

Central three-position Switchboard operating 640 lines for ship intercommunication. Additional provision is made for shore exchange and radio services.

Advt. of The General Electric Co., Ltd. Head Office, Magnet House, Kingsway, London, W.C.2.

The Selenium Self-Generating Type of Cell

by

Gerhart Mainzer

Whilst the properties and application of alkali cells are to-day widely known, selenium cells appear to be less well understood. They are indeed often wrongly described, even in technical periodicals—for example, mistaken ideas are often entertained with regard to what may be termed the "creepage" and also in regard to the temperature effect on this type of cell.

The selenium self-generating type cell in its modern form is actually of even more recent date than the alkali cell. Only during the last five years has it been found possible so to treat selenium as to produce photo elements with the requisite qualities except for the fact that they are composed of the same material. These new elements have nothing in common with the original selenium cells. The creepage is so small as to be for most purposes almost negligible. The effect of temperature variation on the output, as proved by measurements made by the Physikalische Technische Reichsanstalt in Berlin, amounts to only 0.03 per cent. per degree centrigrade with an external resistance of 500 ohms, i.e., less than the temperature variation of the galvonometer-resistance.

Creepage has been observed only in cases when the cell is exposed to very high illuminations. The photo-current at low and moderate illuminations, i.e., up to about 1,000 lux (approx. 100 foot-candles), is in exact proportion to the illumination. If the resistance in the external circuit is sufficiently low this proportionality will be preserved with considerably higher values of illumination.

The value and possibilities of the selenium cell, in spite of extensive scientific researches, have really not been fully established even yet. As the resistance of such cells varies according to the direction of current, they are often described as "rectifier cells" or "layer type cells." But, strange to say, the photo-current of the element runs in the opposite direction to the rectifier effect. The rectifier effect is, therefore, in reality merely a disturbing element of no importance, and the description "rectifier cell" does not give a correct idea of its special qualities.

Selenium photo elements, amongst other purposes, are being used in instruments which register illumination directly by the reading of a galvanometer. This illustrates the similarity of the response of the cell throughout the spectrum to that of the human eye. By the aid of filters the behaviour of the "normal eye" can be imitated almost exactly. For most purposes, however, this is unnecessary. The photo elements vary little, one from the other, in this respect.

The chief application of these cells so far has been in connection with exposure-meters for photographic purposes. Here they have brought about a revolution, and their use for this purpose is extending continually, not only amongst amateur photographers, but also by professionals for scientific purposes.

Photo elements are also used for a great variety of industrial purposes; for instance, in connection with photographic printing frames, for the measurements of reflection and absorption, and in conjunction with relays for counting articles produced in mass.

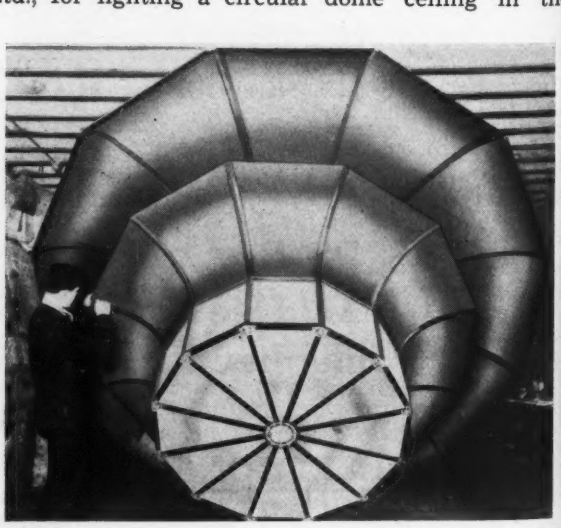
Owing to their low creepage they can also be used in connection with low-frequency amplifiers. In this case a transformer is usually fixed between the photo element and the initial valve. For this purpose small selenium cells, upon which the whole of the available light may be concentrated, are preferred. Owing to the high resistance of such small-surfaced elements a high voltage output is thus secured.

When the choice between a selenium element and an alkali metal cell is under consideration the advantages and disadvantages of both systems should be carefully weighed. For all direct measurements, not requiring an amplifier, the selenium photo element has considerable advantages. It can also be applied, in many cases, even with low illuminations, to operate a relay directly, without an amplifier being necessary. When amplification of the primary current cannot be avoided—for instance, in case of conversion of small fluctuations in light into electric current for the operation of loudspeakers—the photo element has the advantage of not requiring additional voltage.

Alkali cells require direct current. For their operation, therefore, either an anode battery or a transformer with rectifier is necessary. It is true that the internal resistance of the alkali cell is higher, and for this reason higher voltages are obtained, but if the cost of a transformer is taken into consideration this tends to offset the advantages of the higher voltage. Proportionality between voltage and illumination in the case of photoelectric elements and gas-filled alkali photo cells alike can only be relied upon up to saturation point. In this connection no general rule exists as to which of the two systems is to be preferred. In case of very high frequencies, such as for instance for television purposes, only vacuum cells which are practically free from creepage can be used.

An Imposing Fitting

The very large fitting here illustrated, which is 12 ft. 6 in. across, has been designed by Holophane, Ltd., for lighting a circular dome ceiling in the



Floral Hall, Belfast. The two top flares are illuminated in colour and seven 500 W. lamps are mounted in the glass drum at the bottom in order to furnish white light. The latter is adopted when the hall is used for public meetings, and the coloured lighting is turned on when dances take place.

Old and New Gas Lighting on Chelsea Embankment

The old gas lighting, Class "G" in British Standard Specification for street lighting, showing 3-lt cluster low pressure lamps on 9 ft. 6 in. columns.

The new gas lighting, Class "F" in British Standard Specification for street lighting, showing the centrally suspended 10-lt "Rochester" lamps 22 ft. high with a spacing of 145 ft. (Class "F" corresponds with a minimum illumination on a horizontal plane of 0.05 foot-candles, and is the class which the M.O.T. Departmental Committee on Street Lighting, in their Interim Report published last year, recommended as a minimum standard on traffic routes.)

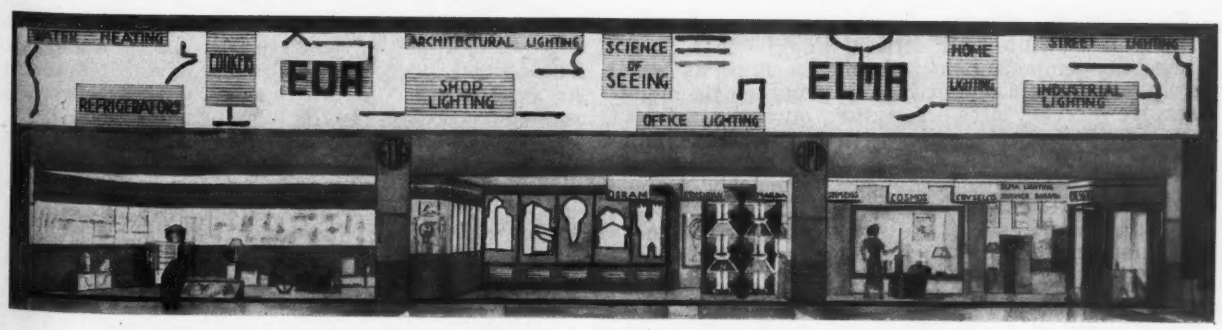
A New Type of Gas Lamp

A new type of gas lamp developed in Edinburgh by Mr. D. G. Sandeman and Mr. A. Scott Kemp, and briefly described in the "Gas World" some time ago, uses low-pressure gas, but is stated to yield 1,500 c.p. as compared with 600 c.p. given by an ordinary low-pressure lamp of similar consumption. The essential feature of the lamp is the use of a small electric fan and motor mounted inside the lamp standard which supplies an air pressure of three inches. The installation cost is said to be favourable as compared with a high-pressure system of equal efficiency. The operation of the lamp evidently demands that an electric supply should be available, but if the inventors' hopes are realised it will compete well with electric lamps. There is certainly something intriguing in this plan of enlisting the help of electricity in order to rival electric lighting!

Identification by Artificial Tan

A new usage has been recently suggested by New York scientists for employing the super high-pressure quartz capsule type of mercury vapour lamp to stencil an identification mark upon the human skin. With modern sources of ultra-violet light and with an exposure at close range one can secure a noticeable tan after an irradiation of some two to five minutes. By using opaque paper stencils the body may be marked with some identifying initials, or perhaps even some of the alleged decorative patterns to take the place of tattooing. This idea revives the practical consideration of marking a convicted criminal during the time of imprisonment, and in such a prominent manner that concealment in the event of escape would be virtually impossible. Artificial tan thus produced may persist for some weeks and the process is a painless one. The idea may perhaps be commended to the attention of Scotland Yard.

Light and Vision at the I.M.E.A. Convention



The above illustration shows a view of the stand designed by the E.L.M.A. Lighting Service Bureau for the I.M.E.A. Convention to be held in Edinburgh this month, with the E.D.A. display next door. A feature of the E.L.M.A. display will again be the exhibit of the now familiar "Light-Sight Tester," with charts bringing out pertinent facts in regard to the effect of light on vision. The study lamp will be a feature and a shop window arranged by an optician on the principle that "although light cannot correct eye defects neither can glasses help us to see in the dark" will be on view. Other exhibits will be devoted to street lighting, office lighting and lighting in the home.

Industrial Lighting

A lecture on the above subject was given by Mr. Howard Long on April 23 in Dublin, where a local section of the Illuminating Engineering Society is being formed.

In his opening remarks the lecturer commented on the relatively low standard of lighting still existing in factories and emphasised the variety of points that need consideration in order to secure good illumination. Amongst other factors, he mentioned adequacy, uniformity, diffusion, avoidance of glare, direction of light, colour, location of fittings, and efficiency. General lighting should be sufficiently uniform to prevent strain on the eye in travelling from the brightly lighted work to surroundings. Diffusion is necessary primarily in order to soften shadows; glare either direct from the sources or indirectly in the form of reflected light is obviously a drawback. Mr. Long emphasised the need for special treatment of particular jobs. He mentioned cases, for example, in which the direction from which the light comes is of primary importance and others in which colour-corrected light is necessary. Reference was also made to the lighting of clothing factories, the treatment of sewing machine benches, and the special problems met with in boot and shoe factories.

Something was subsequently said on the design of lighting fittings and numerous types available for industrial lighting were described. The design of fittings from the standpoint of maintenance was also discussed. Mr. Long pointed out the advantage of reflectors, which are easily adjustable, and the utility of front glass covers in preventing access of dust and diminishing the need for cleaning. Methods of laying out the positions of points, facilities for wiring and lighting calculations were briefly discussed and the value of intensive local lighting with low voltage lamps for exacting work was illustrated. In this connection Mr. Long pointed out the absolute safety conferred by the use of a low voltage system, but remarked on the need for moderate general lighting in addition to the strong local light. Such local lighting is especially helpful when work is done on dark materials, for it is a principle that the brightness of the material worked upon should always be somewhat greater than that of surroundings.

Mercury Vapour at Astronomical Temperature

Dr. John W. Marden recently explained to the American Institute of Electrical Engineers in New York that temperatures probably as high as any likely to be found on earth were generated in high-pressure mercury arcs. Tungsten, our most refractory common metal, will melt near 3,000° C. and the temperature of the outer gases of the sun is probably some 6,000° C. But when an electric arc is operated in a metallic vapour at a pressure of 50 atmospheres, and when the arc stream can be concentrated into a narrow pencil, it is quite likely that the interior of the arc reaches beyond 10,000° C.

Probably the containers for such high temperature arcs can only be of purest quartz, inasmuch as the best grade glass now available will not withstand more than 950° C. However, it is pointed out that in the more recent discharge types of lamps where the electron emission concentrates along the axis between electrodes, there is a very steep temperature gradient from the centre of the arc stream towards its outer surface, and hence a tremendously hot core may be held within a comparatively cool surrounding envelope.

Interesting Shop Lighting

The above illustration shows the appearance at night of the handsome building of Debenham and Freebody (Wigmore-street and Welbeck-street, London), where Siemens "Sieray-Dual" lamps have been recently substituted for gasfilled (filament) lamps of equivalent wattage. The lamps operate off alternating current so that no alterations to existing circuits were necessary. The installation is of special interest as a case in which electric discharge lamps have been introduced for shop-lighting. (The Sieray-Dual lamps, it will be recalled, utilise an electric discharge lamp in combination with a filament lamp, whereby an approach to white light is obtained.).

Flashes

Two contracts, each of 15 years' duration, have been recently entered into by the Whitstable Urban District Council for gas lighting in its area; one of these is with the Whitstable Gas and Coke Company, the other with the East Kent Gas Company, Ltd. Both include schemes of modernisation. Extra lamps are to be erected, more powerful lamps will be substituted for some existing ones, and reflective devices are to be introduced.

* * *

Bridlington is to adopt a new system of street lighting, using blue lamps on the principal roads to produce a daylight effect, and red lamps in roads where there are trees, these having been found more efficient under such conditions.

* * *

The lighting of Nelson's busiest traffic area has been improved by the addition of a central column carrying four high-power gas lamps, each with 15 mantles. The central refuge on which this standard is erected also carries three gas-lighted traffic bollards. The remainder of this area, where five busy roads converge, is lighted by five 3,000 c.p. high-pressure gas lamps.

* * *

A recommendation that an independent lighting engineer should be engaged to advise on the public lighting of Banff (Scotland) has been approved, and Mr. Alexander Forbes, Inspector of Lighting, Aberdeen, has been asked to act in this capacity.

* * *

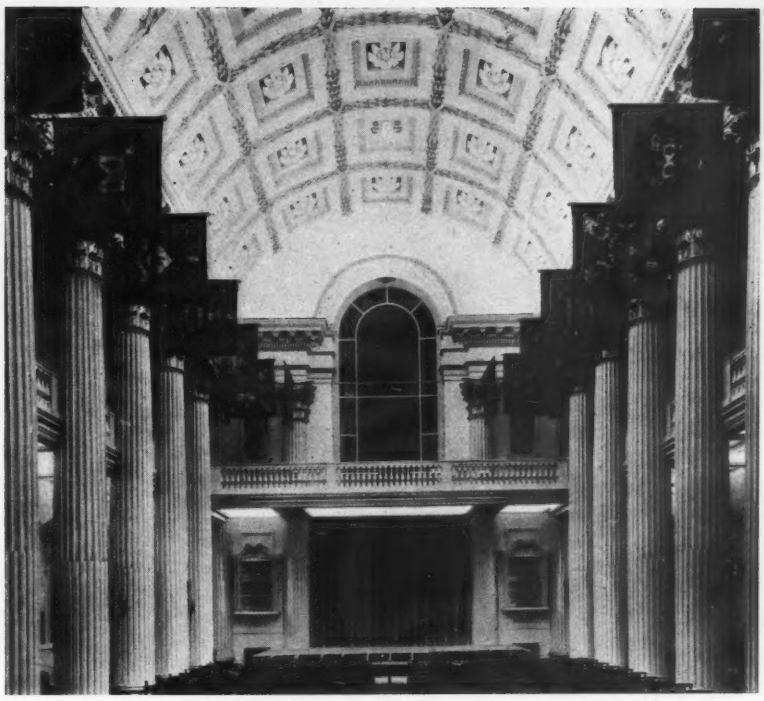
A correspondent has asked us whether Stockport has a full-time public lighting engineer.

* * *

The Strand Electric and Engineering Company, Ltd., is concerned in the lighting of the new B.B.C. television studios at the Alexandra Palace, and likewise in the provision of equipment for special lighting at the Empire Exhibition being held this year in Johannesburg.

Cornice Lighting in Large Halls

Cove lighting and cornice lighting are apt to be regarded as methods primarily of value in small rooms. It is sometimes assumed that because the distance from the floor is great such methods cannot be economically used in lofty rooms. No doubt there is some justification for this idea if economy is a prime consideration, but nowadays it is not so difficult to secure a fairly generous consumption for rooms of distinction. Provided this point can be met, cornice lighting has much to recommend it from the decorative standpoint—especially where a good natural cornice exists. The adjacent picture shows the successful application of cornice lighting for the Egyptian Hall at the Mansion House, which was formerly lighted by a series of pendants, leaving the roof in comparative darkness. The appearance of the interior gains greatly from the new conditions which enable the proportions and design of the room to be clearly seen.



A striking example of Cornice Lighting in the Egyptian Hall of the Mansion House, London.

(From "Architectural Lighting," E.L.M.A. Electric Illumination Handbook, No. 8B.)

Measuring Illumination on the Queen Mary

[By Courtesy of the General Electric Co. Ltd.

An interesting picture taken in the cabin-class main lounge of the Queen Mary. Mr. Thomas E. Ritchie and Mr. Edgar H. Penwarden, two well-known members of the Illuminating Engineering Society, are seen taking measurements of illumination with a Holophane-Edgcumbe Photometer.

Flashes

Local Centres of the Illuminating Engineering Society are being formed in Glasgow and Dublin. Those interested should approach Mr. T. Catten, Lighting Service Bureau of Scotland, 29, St. Vincent Place, Glasgow, and Mr. J. Creagh, 1, Ashbrook Villas, Ashbrook House, Sallymount Avenue, Ranelagh, Dublin.

* * *

Combined gas and electricity showrooms in three areas of Salford are proposed by Alderman J. F. Crane of the Salford City Council. It is believed that closer co-operation between the two departments would be beneficial.

* * *

About two miles of the main shopping thoroughfare in Hereford are now lighted by high-pressure gas lamps, varying in candle-power from 1,000 to 2,000, which are mounted in staggered formation at heights varying from 18 to 22 ft. on steel columns projecting over the roadway. Clockwork control is used.

* * *

London's new Airport at Gatwick, twenty-five miles from Victoria, will be equipped with a landing field nearly 200 acres in extent which will be illuminated at night by three 1,500,000 candle-power floodlights.

* * *

The Sutton Bridge Parish Council has entered into a contract for lighting the streets with gas covering the period to April, 1937.

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from May, Page 147)

II.—PHOTOMETRY.

123. Photo-electric Type Portable Photometers.

British Standard Specification, No. 667, 1936.

This specification is supplementary to that dealing with visual photometers (No. 230—1935). Photo-electric and rectifier photo-electric cells are defined and the effect of temperature, colour of light-source, and oblique illumination are discussed. With light incident normally on the test surface an error, under specific conditions, of 10 per cent. plus 1 per cent. of the full scale value of the range of measurement is specified. Fatigue effect, after exposure to 50 ft.-c. for ten minutes, shall not exceed 5 per cent. Appendices deal with suitable ranges and with measurements, including large colour differences. J. S. D.

124. Photo-electric cells for Light Measurement.

H. H. Poole and W. R. G. Atkins. Electronics, 9, No. 4, p. 42, April, 1936; Phil. Trans. Roy. Soc., 235, pp. 1-27, 1935.

A report is given of tests made on a wide variety of vacuum emissive and barrier cells in conjunction with a number of different sources. The sensitivity and constancy are discussed. S. S. B.

III.—SOURCES OF LIGHT.

125. The Present Position of Carbon Arc Lamps for Illumination.

H. Groher, Das Licht, p. 85, May 10, 1936.

The author briefly reviews the development of the carbon arc lamp and describes some of its most recent developments, such as the long burning enclosed flame arc lamps, the use of which in Leipsic and elsewhere is illustrated. J. S. D.

126. High Intensity Mercury Vapour Lamp.

C. E. Weitz and W. G. Darley, Magazine of Light, IV., No. 5, pp. 17-25, Autumn, 1935.

Details are given of a new mercury vapour lamp consuming 400 watts. Instances are given with photographs of the use of these lamps, sometimes in conjunction with tungsten lamps, both in office and industrial lighting. In one instance of industrial lighting with both types of source, 80-foot candles were obtained on the working plane. C. A. M.

IV.—LIGHTING EQUIPMENT.

127. Symmetrical Light Distributions from Lighting Fittings.

British Standard Specification, No. 398-1936.

The specification aims at meeting the need for a common terminology by which the characteristics of lighting fittings can be described. This is done in terms of (a) the class of lighting for which the fitting is intended, and (b) the character of the light-distribution curve. Definitions of direct, semi-direct, general, semi-indirect, and indirect fittings, in terms of the proportions of light flux directed into the upper and lower hemispheres are given, and the description of distribution characteristics in terms of the "frame ratio" (ratio of width to height of a rectangle enclosing the polar curve) is explained. Tables of corresponding spacing height ratios for a specified uniformity of illumination are also presented. J. S. D.

128. Bowl-Silvered Lamps.

Anon. Magazine of Light, IV., No. 7, pp. 3-4, December, 1935.

A complete range of bowl-silvered general service lamps, inside frosted, is now available in America. C. A. M.

V.—APPLICATIONS OF LIGHT.

129. School Lighting.

Anon. Magazine of Light, IV., No. 4, pp. 9-15, Summer, 1935.

Problems associated with the lighting of schools are dealt with in detail. Numerous photographs of representative installations are given, with particulars of equipment and results. C. A. M.

130. Barts Medical College.

Anon. Electrical Review, CXVIII., No. 3,048, p. 600. April 24, 1936.

Describes briefly and illustrates the lighting of the laboratories and lecture rooms at the new medical college of St. Bartholomew's Hospital. J. M. W.

131. Paint—A Partner in Better Seeing.

A. H. Kennedy. El. World, 106, p. 898, March 28, 1936.

The author stresses the important part that the paint used in workrooms can play in assisting the lighting. A table of the reflection factors for different coloured paints is given. The psychological effect of various colours is also mentioned. S. S. B.

132. Lighting in Print Shops.

Anon. El. World, 106, p. 934, March 28, 1936.

A survey of lighting in twelve printing establishments in Chicago has been made, and a table is given of the values provided at different positions and for various operations. These figures show existing practice, and the author points out the need for development in this field. S. S. B.

133. Light for the Store.

J. M. Ketch and A. Rogers. Magazine of Light, IV., No. 7, pp. 15-28, December, 1935.

Problems arising in shop lighting are dealt with in detail. Various types of direct and indirect units are indicated. Particular attention, with diagrams, has been given to wall and counter cases, shelving, counters, mirrors, tables, and incidental displays. C. A. M.

134. Up-to-date Shop Lighting Methods.

Anon. El. Rev., Vol. CXVII., No. 3,050, p. 679, May 8, 1936.

Describes, with photographs, a new shop-lighting installation, in which directional fittings are used to concentrate light where it is needed. R. G. H.

135. Architctural Lighting in Norway.

L. Berg. Das Licht, p. 91, May 10, 1936.

A brief illustrated description of the lighting of various theatres, cinemas, etc., in Norway, is given. The lighting is mainly indirect, but use is also made of lamps mounted behind panels of diffusing glass. J. S. D.

136. San Diego Exposition.

A. Rogers. Magazine of Light, V., No. 1, pp. 4-16, January, 1936; No. 2, pp. 21-27, February, 1936.

Numerous photographs with diagrams are given, showing lighting effects produced at the California-Pacific International Exposition of 1935. C. A. M.

137. Luminous Advertising.

G. R. Lawall. Magazine of Light, IV., No. 5, pp. 26-27, Fall, 1935; No. 4, pp. 24-25, Summer, 1935.

Constructional details are given of a successful built-up luminous panel lighting installation. Data are also given on the construction of wedge-shape fittings of this type, to give minimum diversity in brightness. C. A. M.

138. Gasoline Service Stations.

C. M. Cutler, Magazine of Light, IV., No. 5, pp. 4-16, Fall, 1935.

General lighting problems associated with petrol service stations are dealt with in detail. Considerable attention has been given to uniformity of brightness in luminous built-up units, and with this in view lamp spacing

data are given in the case of luminous letters and pylons. When letters are shown in silhouette, details of the contour of a suitable troughing are given. Island display cases are included, and the lighting of pits beneath cars is considered. Post height for outdoor lighting equipment are recommended to be at least 25 ft. for good practice, and the suitability of various street lighting and floodlighting equipment for this purpose is considered. C. A. M.

139. Mercury Vapour Lighted Petrol Station.

Anon, Electric Journal, Vol. 33, No. 3, p. 136, March, 1936.

A photograph and short description of the floodlighting of a building and large open space by mercury vapour lamps. R. G. H.

140. Sioux City Civic Monument.

C. R. Tracy, Magazine of Light, IV., No. 4, p. 23, Summer, 1935.

Details, with a photograph, are given of the lighting equipment of the Sioux City Civic Monument. C. A. M.

141. Ultra-violet for Poultry and Dairy.

L. C. Porter and J. P. Ditchman. Magazine of Light, IV., No. 6, pp. 19-25, Fall, 1935.

The use of lamps giving ultra-violet radiation in poultry and dairy farming is dealt with in detail. C. A. M.

142. Fluorescent Paint Offers New Load.

Anon. El. World, 106, p. 1,062, April 11, 1936.

A brief article describes an installation at a San Francisco club where ultra-violet light is used in conjunction with fluorescent paint to give unusual effect to the decorations. Twelve Cooper-Henrith tubes are used for this purpose, in addition to the normal incandescent filament lamp lighting. S. S. B.

143. Greenhouse with Little Glass.

L. C. Porter. Magazine of Light, IV,. No. 7, pp. 11-13, December, 1935.

Results are given of vegetation growth in a heat-insulated building with minimum fenestration. Heat and light were mainly obtained from incandescent lamps, and the necessary carbon dioxide was obtained from the evaporation of dry ice. C. A. M.

144. Infra-Red Therapeutic Equipment.

L. C. Porter and J. P. Ditchman. Magazine of Light, V., No. 1, pp. 25-27, January, 1936.

Details are given of equipment using Tungsten lamps for therapeutic treatment. C. A. M.

145. Gloss Investigations Using Reflected Images of a Target Pattern.

Richard S. Hunter. J.O.S.A., 25, pp. 190-196, April, 1936.

A target pattern of concentric rings, varying from fine lines to broad bands, is placed in the open face of a desk lamp. Records may be made of which lines and bands are visible by reflection from different surfaces. Photographic records of gloss and unusual gloss effects are discussed. F. J. C. B.

Visible 25 Miles Away

A Huge Sign in Ceylon

One of the most unusual and impressive signs ever erected is described in a recent issue of "Signs." This takes the form of the message "Ceylon for Good Tea." It has an overall height of 160 ft. and a width of 230 ft. The sign is mounted on two lattice towers 150 ft. apart. The larger letters in the sign are 15 ft. and the smaller ones 10 ft. in height. They are finished in white and have a double neon outline in blue and white, a flasher being used to spell out the letters. Even in day time the sign has a considerable range, and when illuminated at night it is visible to vessels twenty-five miles out at sea.

Light Tubes in Script

An unusual sign erected with "Edisign" material for the Vaudeville Theatre (Strand, London). The light tubes in this case have been specially formed for the lower case type of script letter required in this instance. (Further reference to these new Edisign letters is made on p. 194).

Plastic Materials for Lighting Fittings

The use of synthetic and plastic materials for supports for lighting glassware is familiar, but the production of translucent material to take the place of the actual diffusing material, glass, has been the subject of much discussion and study, especially in the United States. An illustrated account of some such fittings recently appeared in "Lighting and Lamps," in which several varieties of material were mentioned. Apparently almost any shape of luminaire can be prepared from this plastic material. Panels, cups and bowls, louvres and lamp shades are illustrated. A very fair degrees of translucency with such diffusing material can be secured. In one instance transmissions varying from 46 to 58 per cent. for thicknesses varying from 80 to 40 thousandths of an inch are reported. As there is also a substantial amount of reflected light the overall efficiency of such luminaires may be relatively high, usually 70-80 per cent., though in one case as much as 90 per cent. is apparently claimed.

As regards the influence of heat, tests are said to have demonstrated that materials can be prepared capable of standing exposure for more than 500 hours to a temperature of 155° F., and as such fittings have been in practical use for periods of several years, one gathers that there is no evident loss in translucency with time.

Shades of plastic material have the great advantage of possessing a high degree of elasticity, and can be packed and transported with ease. They do not break readily, and if breakage occurs there is practically no danger of anyone being injured by sharp edges of fragments.

Of special interest are the possibilities of producing from such material pieces very much larger than are practicable when glass is used. It might, for example, be possible to make one-piece bowls for use under doomed recesses in ceilings of considerably greater dimensions than are usual at the present time.

Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 443,729. "Improvements Relating to Advertising Projectors."

The Cinescope Publicity Company, Limited, and Hasselkus, J. W., August 30, 1934.

This specification relates to advertising projectors for projecting images of diapositives on to a screen or reflector with light from a source. According to the invention the projector has a slide carrier in the form of a wheel with an axially overhanging rim on which the diapositive slides are mounted, and the source of illumination is located within the space which is partially enclosed by the overhanging rim of the wheel. The wheel is rotated step by step, and a rotating shaft carries a cam which operates a latch for maintaining the wheel stationary between the steps. The wheel may be advanced in steps by an arm projecting radially from the rotating shaft and engaging pins on the periphery of the wheel.

No. 443,846. "Improvements in and Relating to Electric Discharge Lamps."

The British Thomson-Houston Company, Limited, Warren, H. W. H., Davies, L. J., and Mitchell, J. H., September 10, 1934.

This specification relates particularly to high-pressure vapour lamps, such as mercury and cadmium vapour lamps, which usually have self-heated cathodes and a low-pressure filling of rare gas. In order to reduce the length of such lamps and, at the same time, to avoid the arc being deflected against and injuring the envelope, as would occur owing to convection currents if the lamp tube were merely doubled upon itself, the lamp comprises a tube which is divided by a glass or other suitable insulating barrier, which is in close contact with one end of the tube but does not extend to the other end, into two compartments in which two discharges are maintained. At each end of these compartments an activated self-heated cathode is placed and the two cathodes remote from the cap end of the lamp are connected together. Two arcs are thus produced which are electrically in series with one another, but are geometrically parallel and side by side.

No. 443,973. "Improvements in and Relating to Lanterns for Electric Lamps."

The British Thomson-Houston Company, Limited, Tuppen, E. B., and Wood, C. W., September 10, 1934.

According to this specification a lantern for a gas discharge lamp has three compartments, that for containing the lamp being unventilated, while the others for containing control gear are ventilated.

No. 444,119. "Improvements in Electric Discharge Lamps."

The General Electric Company, Limited (Communicated by Patent-Treuhand-Gesellshaft für Elektrische Glühlampen), October 5, 1934.

This specification relates to anodic incandescent lamps, that is lamps the visible light of which forms part of the thermal radiation of an anode heated by an electric discharge. According to this specification the anode consists of a plurality of fine wires with their free ends directed towards the cathode or cathodes of the lamp. The wires preferably do not exceed 20 μ in diameter and are of refractory material such as tungsten or tantalum carbide. Each wire may be a helix with a straight free end and the envelope may contain some caesium vapour.

No. 444,400. "Improvements in and Relating to Gaseous Electric Discharge Devices."

The British Thomson-Houston Company, Limited, and Ruff, H. R., September 19, 1934.

In order to permit discharge lamps of the constricted or arc discharge type to be operated satisfactorily with the lamp axis other than vertical, for example horizontal, a coil is wound around the envelope along the arc axis and, when energised appropriately, magnetically controls the position of the arc. The coil may be connected in series with the lamp and may be cut out automatically, for example by a liquid tilting switch, when the lamp is in the vertical position.

No. 444,566. "Improvements in or Relating to Electric Incandescent Lamps."

Société Anonyme pour les Applications de L'Electricité et des Gas Rares Établissements Claude-Paz and Silva, January 23, 1934 (*Convention, France*).

This specification covers an incandescent electric lamp having a filling of krypton and from 5 per cent. to 20 per cent. of xenon with less than 1 per cent. of nitrogen. The helical filament may have a greater pitch than is usual.

No. 444,648. "Improvements Relating to Electric Light Fittings."

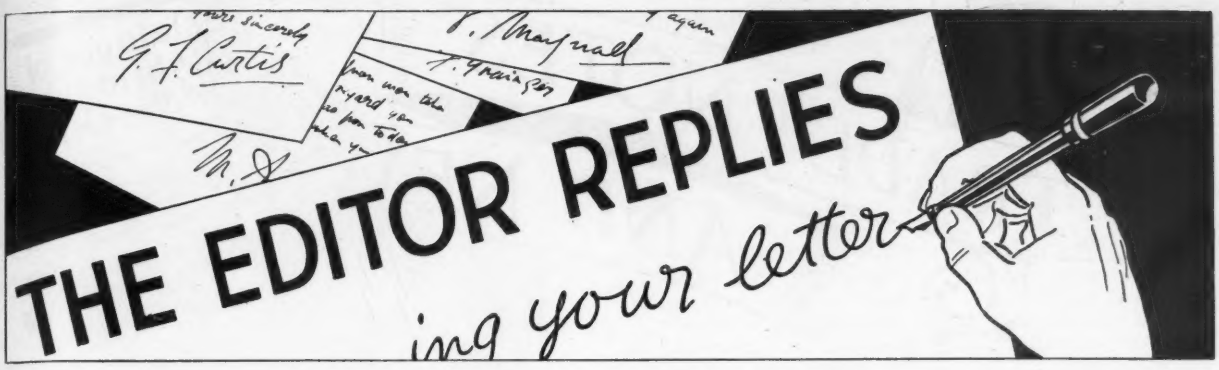
George Ellison, Limited, and Anderson, J., October 15, 1934.

This specification describes a fitting adapted for use in coal mines when it is required to distribute the light laterally over the coal or other face on or adjacent to which the fitting is mounted. The fitting comprises a hemispherical or dished transparent front and a truncated conical reflector mounted upon the front with its axis horizontal so as to reflect light laterally while allowing some to pass through the truncation of the conical reflector, a number of small holes being formed in the reflector to minimise any shadow cast thereby.

No. 444,942. "Improvements in Luminous Signs."

Imre Sors, September 5, 1935.

This specification relates to luminous signs for displaying the various letters of the alphabet, numerals, etc., the character shown being changeable at will. The sign comprises luminous gas discharge tubes having end electrodes and also electrodes intermediate of their ends, the tubes being shaped so that selective partial or complete illumination displays various desired characters. The configuration of the tubes is such that they outline a parallelogram and form within that parallelogram a pattern which is symmetrical about one or more bisectors parallel to the sides of the parallelogram. The pattern preferably includes circles and arcs of circles.



I want to know, you know!

(Rosa Dartle)

A reader who has recently visited some of the leading stores remarks on the very **highly diffused architectural** lighting sometimes adopted. His womenfolk complain that in such conditions they "cannot see things properly," even though the illumination appears to be ample. Why is this? We are not sure that we can give a complete answer, but it does seem that too complete diffusion and monotony of brightness produces an impression of imperfect visibility.

Mr. H. S. Barlow, whose knowledge of photometric matters and experience as a teacher demand respect, has rather taken exception to a diagram used in "**Everyday Photometry**" (Fig. 2, p. 111, April, 1936), on the ground that students are inclined, because the diffusely reflected rays are shown of equal length, to assume that the candle-power of an illuminated flat surface is equal from all points of view. On the other hand, if the rays were varied in length in proportion to the candle-power a mistaken inference might be drawn about the brightness. This should, theoretically, be the same whatever the point of view. On the whole it seems best to adopt rays of uniform length to indicate even brightness, leaving it to be assumed as a natural result that the candle-power will vary according to the projected area visible in each direction.

We have been delighted to hear from Mr. A. P. Trotter, who, as he is approaching his eightieth year after a lifetime spent in the study of illumination and photometry, is in a particularly good position to estimate the **requirements of the eyes** of people who are getting on in life. His own experience rather runs counter to the view expressed in our last issue (p. 134) that a small pupil aperture is usually favourable to acuteness of vision. Mr. Trotter's own case seems to be that of one whose eyesight has been remarkably preserved, except for the development of a slight cataract, not unusual at his age. Therefore he prefers an enlarged pupil, which enables him to see round the obstruction, and in full sunlight out of doors finds the broad brim of a hat useful in cutting off the bright sky (the Wiltshire, not the London variety!).

We quote this experience as most instructive in showing how **personal experience affects judgment** on lighting problems. We can well believe that in such cases of advanced age an enlarged pupil is an advantage—as, indeed, it should be in the case of all eyes that are free from lens-defects. But the combination of circumstances is surely a somewhat unusual one. It is in the more common case of persons in the sixties, whose eyes have developed myopia and astigmatism that a craving for the "stopping down effect" of a bright light is found.

Our note on **light-sensitive cells** last month (p. 156) has brought us some comments. For the benefit of those interested we may mention the names of two firms in this country who supply cells of this kind, Radiovisor Parent, Ltd., and Stafford and Leslie; addresses of both will be found in "Where to Buy."

A reader in Portugal, Mr. C. Pereira da Costa, has sent us a description of a method of **lighting billiard tables** adopted in a café in Lisbon. Instead of the conventional method of lighting by means of pendant lamps in green shades, he has devised overhead lighting from a "caisson" on the ceiling, provided with louvres and with lamps concealed from view. He states that this method, which has also been used in Antwerp, gives more even illumination on the table, and asks whether we have experience of it in this country. We have always assumed that the conventional method is preferred, because the fully shaded lights and relatively subdued lighting of surroundings are favourable to concentration. Have readers any views?

Our reference to **Three-Colour Neon** brought us an invitation to visit the works of Pearce Signs, Ltd. (see p. 189), where such an installation may be seen. For the benefit of readers interested we may also mention that an installation is also to be seen—in the showrooms of the Gas Light and Coke Company, at 31, Sloane-street—surely an example of enterprise in publicity!

A visitor from Australia who is interested in railway administration, and who recently favoured us with a call, was not, on arrival, very favourably impressed by the **lighting of Charing Cross Station.** He had yet not seen Waterloo, but he *had* seen King's Cross, and his comments on the lighting there were even more critical! He was, in fact, frankly disappointed that the Old Country had not put up a better show, and we had to own that some London railway termini can hardly be regarded as in the forefront of progress in lighting!

It does seem a pity that visitors from abroad, on arrival in London, should receive such unfavourable impressions. Some of our stations might with advantage imitate **Euston,** which, it is stated, is **to be completely rebuilt** during the next five years and to be equipped with a magnificent new hotel, shops, and restaurants, a supercinema, waiting, writing, and bathrooms, a covered car enclosure—and, no doubt, the very latest form of lighting. As we have been taken to task by railway engineers in regard to the accuracy of some recently published data, we hasten to add that the above facts (like the others quoted) recently appeared in the daily Press.

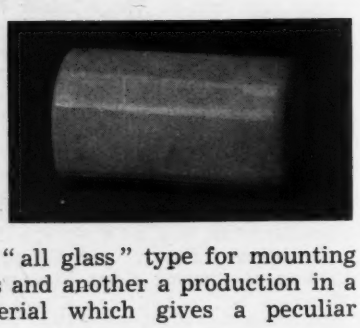
Several readers have asked when the full illustrated account of the equipment in the **new N.P.L. photometric laboratory** will appear. This description was necessarily postponed until the official opening of the buildings, but in the meantime we can assure readers that Dr. Walsh is hard at work on the description, and that publication in the *Transactions* will not be long deferred.

TRADE NOTES AND NEWS

Special Lighting Fittings

We have before us some leaflets depicting fittings of unusual design, which are the work of Mr. Oswald Hollmann, of Beckenham. We illustrate two of these below. Other neat designs in glass and majolica are

The Pastel Crystal Fitting—an unusual type of semi-indirect fitting made entirely of glass in non-fading pastel colours; in amber, rose or green.



A convenient Strip Lighting Unit; such units can be assembled to fit closely against one another and furnish a line of unbroken light.

listed, one being an "all glass" type for mounting on walls and ceilings and another a production in a special crystal material which gives a peculiar "pearl like" effect.

The "Capaswitch"

The "Capaswitch," a new electrical device now marketed by the G.E.C., serves to light up a window automatically when a person approaches—thus automatically exciting their interest. The device is in effect a wireless receiver operated by the electrical capacity of the human body. Each unit will control a normal load of 2 kW., i.e., up to twenty 100 W. lamps. Loads in excess of this can be handled by a contactor.

Kandem Electrical, Ltd. : New Address

Owing to rapid expansion of business Kandem Electrical, Ltd., has removed its head office to Kandem House, 769, Fulham-road, London, S.W.6. The stores department now occupies 711-715, Fulham-road, whilst the works remain at 10, Parsons-green. In addition, the department dealing with plant (motors, dynamos, transformers, and switchgear) has now been transferred to a separate company under the name of Kandem Motors, Ltd.

Attractive Showrooms

A Visit to the Sun Electric Company, Ltd.

In the course of a recent visit to the showrooms of the Sun Electric Company, Ltd., in the Charing Cross Road, one was struck by several new features, chief amongst these being the ingenious escalator arrangement, which now enables goods to be transferred automatically from one floor to another for packing, dispatch, or counter delivery. In the display of fittings, traditional, architectural, and modern styles are well represented. For the moment we illustrate two little gadgets which happened to catch the eye, but there are a number of other items we mean to introduce to readers.

A portable unit with delicate china figure serving as support—a very popular type at the present time.

Another pleasing little lighting device on view at the showrooms of the Sun Electric Company, Ltd.

AN IMPOSING SIGN

This striking sign, erected outside the showrooms of the Gellygaer U.D.C. Electricity Dept., consists of standard Cosmos "Decora" lamps mounted on polished black Traffolyte (which is also a Metrovick product). The sign has a striking appearance by day and is even more effective at night, the letters being in white opal, the border orange-amber, and the centre piece in green. The total loading is 3 kW.

A New Holophane Lantern

The above illustration shows a new Holophane fitting—the Lennox Lantern—which is being shown at the I.M.E.A. Exhibition at Edinburgh. This is a pedestal type refractor intended for use on promenades and in squares and gardens. The use of band refractors, symmetrical and asymmetrical, ensures efficient light distribution, and the general appearance is in keeping with the surroundings for which the fitting is designed. The unit is made in two sizes, for 100-150-watt and for 300-watt lamps.

We learn that Mr. Guy Campbell, the chairman and managing director of Benjamin Electric, Ltd., is paying a short business visit to the United States, and sailed on the Queen Mary on her maiden trip from Southampton on May 27.

Three-colour Neon

In the course of a recent visit to the works of Pearce Signs, Ltd., at New Cross, we were afforded an opportunity of seeing one of the new "three-colour" neon installations in operation. The three tubes, red, green, and blue, symmetrically encircle the room, giving a soft lighting effect. The red colour is produced by the natural neon gas in clear glass, the blue light from a somewhat different gas—probably an admixture of various gases—and the green light by the use of tinted and fluorescent glass. With all the three tubes full on the resultant colour is visually a close resemblance to daylight—decidedly more so than the light from the ordinary filament electric lamp. It is usual, however, to instal resistance dimmers in the circuits of each of the tubes. By this means any colour may be dimmed and the hue of the combined light varied accordingly. As there seems to be some little doubt in the minds of many people to what extent neon lights can be thus reduced, we might add that there is no difficulty in reducing the light to about 15-20 per cent. of its full value; after that stage is reached, however, the light is inclined to flicker, and if the dimming process is continued will become extinguished before the full dimming process is completed.

In an adjacent room we saw a variant of the same method of lighting, a two-colour combination of red and yellow light, the latter produced in a tube coated with fluorescent material. This arrangement gives light of a pleasant golden colour—recommended for festive occasions!

Elsewhere we were shown special signs and devices using tubes of various shapes and sizes, and a specimen case illustrating the great variety of colours that can now be obtained from glass tubes coated with different fluorescent materials. It was interesting to learn that at present no material sign of "fatigue" in such fluorescent substances has been noted.

In the adjacent factory all the processes involved in the production of neon lights—with the single exception of the production of the gas—were to be seen in operation. The work is of an interesting and somewhat specialised nature, as in general every sign differs from every other and requires special design. The firm has built up an extensive maintenance connection, and for this purpose maintains a fleet of workmanlike repair vans—some of which have neon signs, operated by a small generator within the van, installed on the roof!

At the entrance to the works is an ingenious "animated" neon sign, picturing a little man climbing up a ladder. This never fails to attract the attention of passers-by and effectively advertises the works.

A Novel Gas Fitting

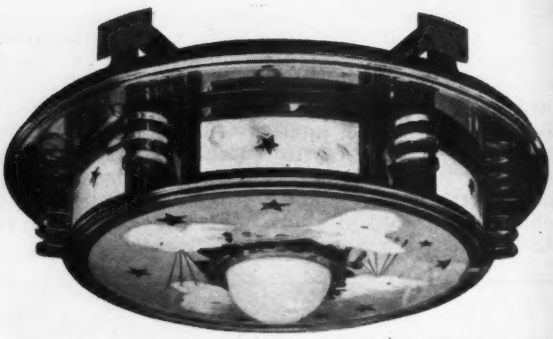
We reproduce above a new and interesting form of gas lighting unit, which was used for much of the lighting of the main Gas Industries stall at the recent Ideal Home Exhibition at Olympia. This "Veritas-Saturnite" unit, which has been developed by Messrs. Falk, Stadelmann and Co., Ltd., resembles in design the new electric architectural lighting fittings sometimes described as the "planet" type. It comprises a 1-light burner with enamelled corona, 8-in. painted hard glass opalene globe with 16-in. engraved glass plate, chromium finished pendant with switch control.

B.T.-H. Lighting Equipment on the "Queen Mary"

On the right will be found a pleasing view of the "Queen Mary," floodlighting by night. Below are presented several fittings of unusual design. Another novel feature for which the B.T.-H. is responsible is the music-controlled coloured lighting in the ballroom, operated by means of the Thyratron Reactor Dimmer.

The Queen Mary with her three giant funnels and upper structures floodlighted by Mazda Lamps in Mazdalux Three Floodlight Projectors.

The central Decorative Fitting in the Main Hall.



The beautiful central fitting over the dance floor in the Verandah Grill.

The Parrot Cage Fitting for the Children's Playroom—an unusual device with light projected downwards from the base of the cage.

A decorative glass column fitting for the Verandah Grill.

MAZDA

LAMPS
and
BTH LIGHTING EQUIPMENT

STAND No 1
I.M.E.A. Convention
Waverley Market
Edinburgh

The B.T.H. Stand at the I.M.E.A. Convention Exhibition at Edinburgh should prove of intense interest to visitors.

Mazda Light Tubes for decorative and display lighting are prominent on the Stand. Their place in the modern home is effectively illustrated by two small scale rooms—lounge and bedroom—in which Mazda Light Tubes are used to light, decorate and harmonise. These installations in miniature show how successfully Mazda Light Tubes may be used without mountings and fittings.

THE QUEEN MARY: An item of general interest is the illuminated model of the Queen Mary. Tens of thousands of Mazda Lamps are used in this wonder liner.

MAZDA LIGHT TUBES: Mazda Light Tubes are made in a number of straight lengths, in curved sections of three different radii, and in right-angle sections. All are available in a standard range of attractive colours, both sprayed and coloured opal.

It is interesting to note that an alphabetical series of Mazda Light Tubes has been developed. These have resulted from the original Mazda Architectural lamps, and a growing demand for more "lines of light" which are applicable to display work.

MAZDA MERCRA LAMPS: Since the last Convention, the 150 watt Mazda Mercra Lamp (for lighting narrow roadways and for industrial lighting) has been developed, and is on view with the other types of electric discharge lamps.

BTH LIGHTING EQUIPMENT: The new extended range of BTH Street Lighting Lanterns for use in conjunction with Mazda Mercra Lamps will be particularly interesting to Municipal and Lighting Engineers. Installations have been carried out in many parts of the country, and it is generally accepted that these BTH installations, by reason of their high efficiency and reasoned planning, have largely contributed to the increased safety of our roads.

Brighton and Eastbourne Roads, Coulsdon, illuminated by Mazda Mercra Lamps in BTH Diron Lanterns.

R.M.M.V. "Stirling Castle" Writing Room lighted by means of Mazda Light Tubes.

3640

B T-H

THE BRITISH THOMSON-HOUSTON COMPANY, LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

RADIOVISOR

"Light-Actuated" Apparatus

AUTOMATIC CONTROL OF STREET LIGHTING

FACTORY and YARD LIGHTING

ADVERTISEMENT SIGNS

AUTOMATIC CONTROL OF LIGHTING BY MEANS OF DAYLIGHT INTENSITY. ARTIFICIAL LIGHTING SWITCHED ON WHENEVER NECESSARY IRRESPECTIVE OF THE TIME OF DAY.

FULLY ILLUSTRATED LEAFLET FROM RADIOVISOR PARENT LTD., 28 LITTLE RUSSELL STREET, LONDON, W.C.1

Special Lighting on the "Queen Mary"

In addition to the general lighting fully described elsewhere, we hear of several special bits of work that deserve mention.

Stage lighting apparatus for the cabin-class and tourists lounges was furnished by the STRAND ELECTRIC AND ENGINEERING CO., LTD. In the former, footlights, battens, dips and front of house spots were provided; in the latter, the equipment, though on a smaller scale, included a four-colour lighting apparatus for the stage and three-colour decorative lighting in the lounge itself. During recent tests on the vessel the Strand Electric demonstrated colour-changes and striking effects of ultra-violet light on various special fabrics and materials.

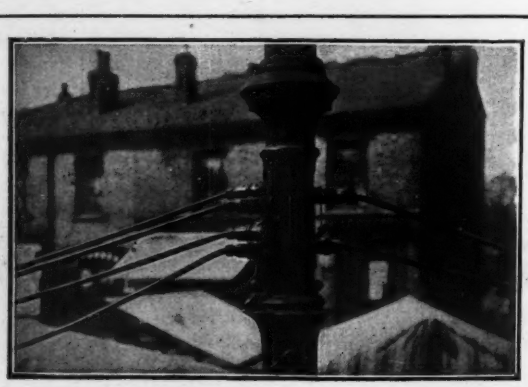
MESSRS. FALK, STADELMANN AND CO., LTD., were also responsible for the provision of a number of special fittings, forming integral elements in the furnishing and atmospheric schemes. There were also special devices—such as the deck indicator signs for the fore and aft stairs, as it was thought the passengers on such a huge vessel were in need of guidance. An effective direction sign illuminated from below was placed on the top step at each floor landing. In the writing rooms, again, an ingenious outfit comprising light source, inkwell, penholder, and calendar was provided. The firm was also reponsible for numerous specially designed ceiling and soffit fittings, ranging from 1½ to 4 ft. and upwards in the principal state rooms and Turkish baths; all of these were made for their respective positions, delivered to time and fitted in position without a single hitch. The whole of the metalwork was silver bronze, with glassware of various types and colours to suit the surroundings.

We understand that specially designed fittings of Harcourt manufacture have been very widely used for example in the two private dining rooms, lecture room, music practice room, children's playroom, drawing room, raised sun deck, main entrance and "A," "B," and "C" deck entrances, main staircase, etc., in the cabin class. Special fittings for shop lighting have also been provided, for example, in the Austin Reed shop on the promenade deck (cabin) and in the company's shop and the Austin Reed shop in the tourist class.

In addition to the General Electric Co., Ltd., and the British Thomson-Houston Co., Ltd., we understand that Siemens Electric Lamps and Supplies, Ltd., furnished thousands of Siemens lamps for use on the vessel and that thousands of lamps were likewise supplied by the Edison Swan Electric Co., Ltd.

Siemens Record of Long Service

During the past month Messrs. Siemens Electric Lamps and Supplies, Ltd., held their annual conference with home branch managers and the London management. An interesting sidelight on the happy relations existing in the Siemens organisation is reflected in the fact that the aggregate service of those present amounted to 497 years!—the average figure being over 26 years!



This illustration of part of a "NIPHAN" market lighting installation shows main feeding sockets fitted to a lamp standard. The "NIPHAN" system is adaptable for every type of temporary or portable lighting installation and designs will gladly be submitted.

MARKET LIGHTING with the NIPHAN System . . .

FOR some years we have been collaborating with public lighting authorities in devising temporary lighting installations for market stalls. The picture shows part of a "NIPHAN" market job, in which 6 sockets, in conjunction with a fuse board, were mounted on a lamp standard, with plugs leading to 3-way tees and suspended through-sockets.

¶ *Our extensive market lighting experience is at your disposal.*

Announcement of

SIMMONDS & STOKES LTD.,

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NIPHAN

Tel.: Holborn 8637. 'Grams: "Niphon, London."

AUTHENTIC INFORMATION

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BRITISH THOMSON-HOUSTON CO., LTD.

Post Office Stores Dept., Air Ministry, and *Whitby Urban District Council.*—For the supply of Mazda lamps for the next twelve months.

EDISON SWAN ELECTRIC CO., LTD.

General Post Office.—For the supply of carbon filament lamps for twelve months, commencing from May 1, 1936.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD.

Great Western Railway, Air Ministry, and *Post Office Stores Dept.*—For the supply of Siemens electric lamps for a period of twelve months.

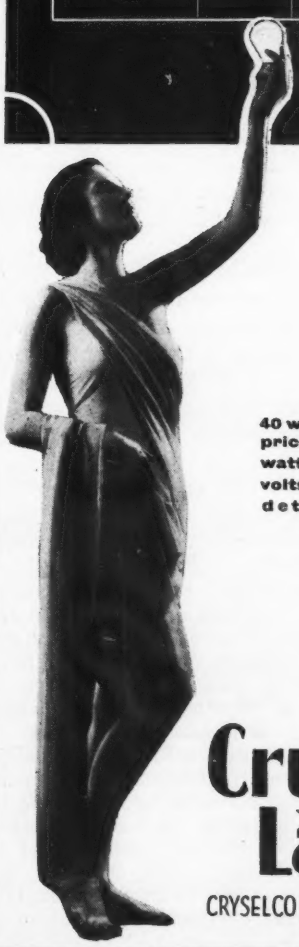
Crompton Lamp Factory in Canada

It is announced that Crompton Parkinson, Ltd., have completed an agreement whereby a new electric lamp factory will be erected in Canada for the manufacture of Crompton lamps, and that in association with established Canadian interests Crompton lamps will be marketed throughout the Dominion of Canada.

CRYSELCO LAMPS are REDUCED in PRICE

REDUCED PRICES (100-130 and 200-260 VOLTS)

WATTS	Pearl	Clear	Opal
15	1/9	1/9	—
25 40 60	1/7	1/9	1/10
75 100	2/3	2/6	2/9

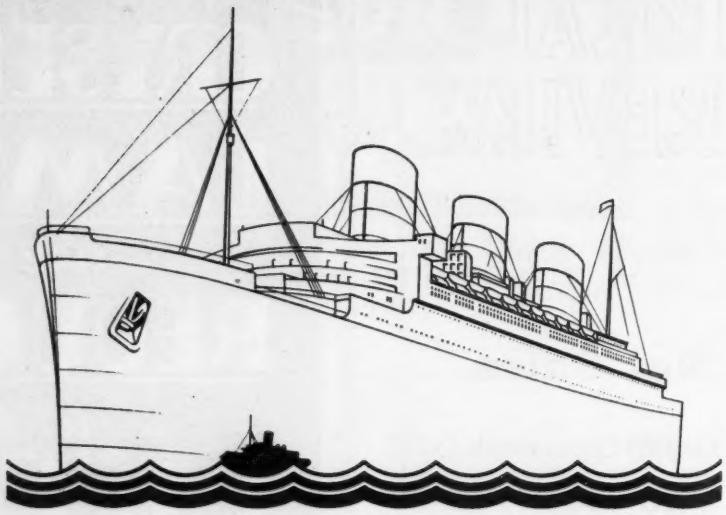


40 watt vacuum clear price unchanged. 25 watt opal for 100-130 volts only. Write for details of other reductions.

Cryselco Lamps

CRYSELCO LTD., KEMPSTON WORKS, BEDFORD

THE "QUEEN MARY"



Several Hundred Lighting Fittings of Varying Styles & Sizes—Designed in Co-operation with the Architects and Interior Decorators—were Manufactured by

FALK, STADELMANN & CO., LTD.

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF LIGHTING FITTINGS

83-93, FARRINGDON ROAD, LONDON, E.C.1

Branches at: GLASGOW: NEWCASTLE: MANCHESTER: LEEDS: BIRMINGHAM: LIVERPOOL CARDIFF & DUBLIN. Works at LONDON: BIRMINGHAM & RAINHILL.

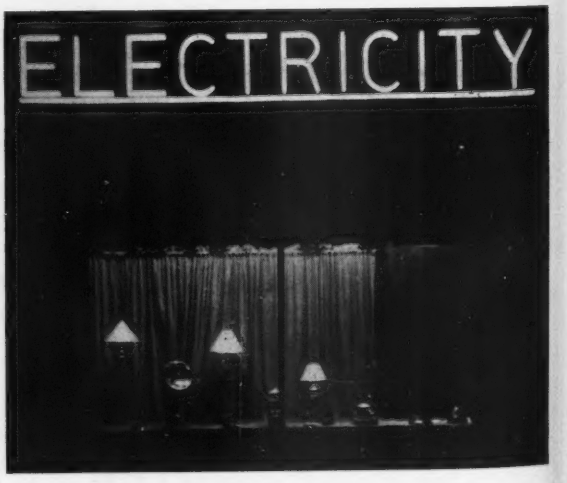
"Edisigns"

The adjacent picture illustrates the application of an ingenious novelty recently introduced by the Edison Swan Electric Company, Ltd.—the development of standard shapes of tubular lamps from which all the letters of the alphabet can be readily assembled.

We hope to describe these more fully in a special article shortly, but in the meantime illustrate their use in the accompanying picture of a sign supplied to the City of Lincoln Electricity Department's showroom. The inscription "ELECTRICITY" is composed of 20 in. letters of the "major" type. The underlining is formed by means of standard architectural lamps.

We also illustrate below the special circular type lampholder which has been developed for sign installations. The drilling of one hole $\frac{7}{8}$ in. in diam. in troughing or panel is all that is required to fix this new type of "Edisign" architectural lampholder. Two locking rings are fitted. By releasing the front ring the lampholder can be rotated and sufficient lateral adjustment obtained to ensure accurate centering of the peg cap of the lamp. A resilient rubber washer fits into the seat of the lampholder and prevents any moisture entering, rendering it specially suitable for outdoor use and, incidentally, minimising vibration. A conduit box has been designed for use with these holders and is useful in cases where troughing is not desirable and a neat form of fixture is desired.

The special "Edisign" Lampholder, made in bakelite, white or black, with tinned phosphor bronze contacts.



An effective sign composed of 20" letters supplied to the City of Lincoln Electricity Department's Showroom.

The alphabetical and numerical characters formed by the light tubes are now made in two sizes, namely, major type (20 in. high) and minor type (12 in. high). The tubes are obtainable in white opal, or in six colours of opal glass and are, of course, suitable for all standard voltages and for both direct and alternating current circuits.

ONLY VITREOSIL LIGHTING WARE GIVES THIS MARGIN OF SAFETY

Note the Vitreosil Test. Only Vitreosil Lighting Ware survives this ordeal. Any other lighting glassware, even though it passes the British Standard Specification Test, would be shattered by the shock of sudden cooling from red heat. This means a margin of safety far in excess of the needs of domestic or industrial lighting. It enables Vitreosil Globes, Bowls and Reflectors to be used on high-pressure and super-heated burners without the slightest fear of "flying."

Moreover, smaller shapes can be confidently used, thus concentrating the mantle heat and producing a brighter light which is softly diffused with the minimum loss by passage through Vitreosil.

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On a recent N.P.L. Test (B.S.S. 161—1936), on 500 Gas-filled 230 volt 60 watt Single Coil Tungstalite Lamps, an average life of 1,140 hours was obtained, the average efficiency for life being 9.35 lumens per watt, and the lumen maintenance 97%.

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HOLBORN 2321
2322

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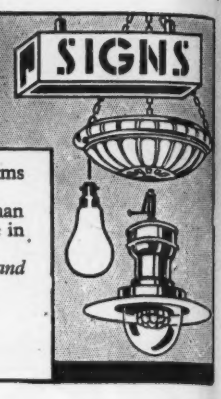
A DIRECTORY OF LIGHTING EQUIPMENT



We invite applications for spaces in this new section of the journal. Particulars of terms for each space (approx. 1 inch deep and 3⅓ inches wide) are given below.

These terms are equivalent to **half our ordinary advertising rates**, but not less than 12 successive monthly insertions can be accepted on this basis, and amounts are payable in advance.

Payment for an advertisement in this section entitles the advertiser to receive *Light and Lighting* during the period of the contract.

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12 Successive Monthly Insertions	£3 10 0	Payable
24 " " "	£6 0 0	in
36 " " "	£8 10 0	Advance

1

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Fittings manufactured to Architects' Specifications

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for all requirements

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BI-MULTI AND MULTIPLANE REFLECTORS
Lanterns, Brackets, Columns, Switch and Fuse Boxes, etc., FOR STREET LIGHTING
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Manufacturers of "FLOOD" Units

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GAS CONTROLLERS, ELECTRIC, and SYNCHRONOUS TIME SWITCHES

Manufactured by:—

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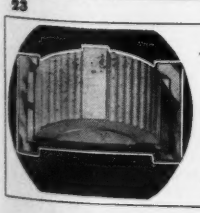
23



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Headlights, Street Lamps, Poles, Reduction Gears, Signal Lamps, Flashing Shutters, Cable Drums, Guide Pulleys, etc., etc.

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SMOKE INDICATOR AND RECORDER.

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ELECTRIC LAMPS of all types. "SIERAY" ELECTRIC DISCHARGE LAMPS. ELECTRIC LIGHT FITTINGS. FLOOD-LIGHTING APPARATUS. SHOP-WINDOW LIGHTING EQUIP-MENT. STORE LIGHTING. INDUSTRIAL LIGHTING, CINEMA LIGHTING, ELECTRIC SIGNS, Etc.

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PLUGS, SOCKETS, TEES, COUPLINGS, TERMINAL SOCKETS AND JOINT BOXES *for every portable and temporary lighting requirement.*
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Sole Makers—Walter Slingsby & Co., Ltd., Keighley.

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For every type of GAS LIGHTING
SUGG WESTMINSTER
When you want the best!
CHAPTER ST. S.W.1

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STREET LIGHTING EQUIPMENT. TRAFFIC SIGNALS
PRISMAT BULKHEAD FITTINGS. FLOODLIGHT PROJECTORS
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N.B.—The numbers are those attached to individual entries in the Directory (See pp. 196-198.)

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PHOTO-ELECTRIC CELLS
Selenium Layer Type (Brit. Pat.) round or Rectangular, for all kinds of light-sensitive apparata.
STAFFORD & LESLIE,
ARMOUR HOUSE, ST. MARTIN'S-LE-GRAND, LONDON, E.C.1
Tel. National 5025

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DESIGNERS AND ACTUAL MANUFACTURERS OF MODERN :: FITTINGS AND ARCHITECTURAL LIGHTING UNITS ::
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AND ENGINEERING CO., LTD.
19-24, FLORAL STREET, LONDON. W.C.2.
Specialists in Modern Theatrical Lighting
Manufacturers of "Sunray" Lighting Equipment
Electrical Installation Contractors. Lighting Schemes for
Theatres Floodlighting Exhibitions Cinemas Pageants
Shop Windows Dress Parades Ballrooms Tea Lounges

44

"PHOTRONIC" Photo-electric ILLUMINATION METERS BY **WESTON**

45

WHITEWAY LIGHTING
is the best
for Pictures and Tapestry
Installed in leading Art Galleries and private residences.

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46

"THE FITTINGS THAT IMPROVE WITH AGE"
WOODFYT
(WOOD ELECTRIC FITTINGS)
10a, NEWMAN STREET, W.1
(Museum 7325)
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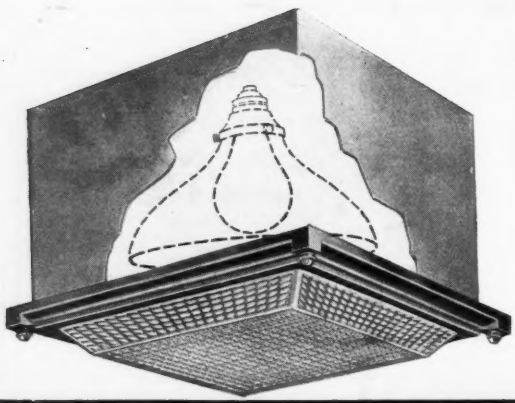
NEW GAS LIGHTING CONTRACTS IN LONDON

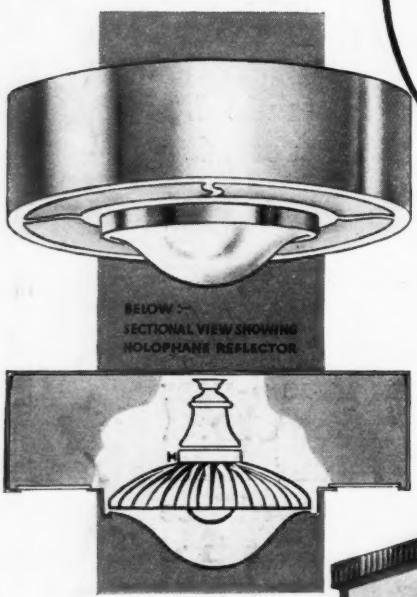
As evidence of the work that is constantly going on to improve London's street lighting, it may be pointed out that lighting authorities in the Greater London area made no fewer than 16 new contracts during 1935 with one gas undertaking alone. These contracts were for periods varying from five years up to fifteen years, and in most cases specified definite improvements in the lighting installations. In all some 8,000 gas lamps are affected by them.

Among these recent agreements, that made by the Southall-Norwood U.D.C. is of interest, for this makes the fourth important London authority since 1932 to sign a 15-year contract for gas lighting. The others are Westminster, Holborn and Paddington.

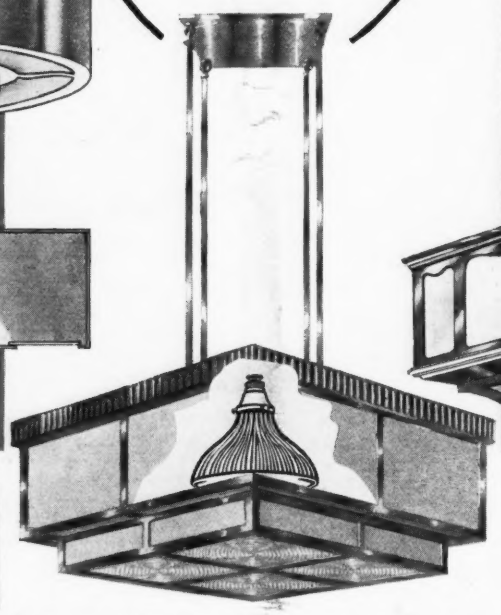
Another recent contract of interest is the 5-year agreement entered into by the Brentwood U.D.C. The contract specifies gas entirely. Half a mile of the High Street is to be lighted in accordance with Classification 'D' of the British Standard Specification, and four miles of main roads will comply with Classification 'F.' Lamps on other stretches of main road and on all side roads are to be increased in candle power and the number of lamps employed will be very largely increased.

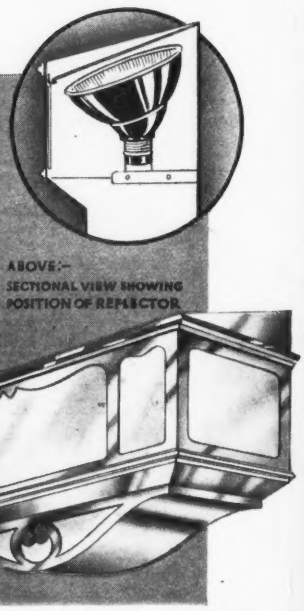


The Heart of a Good Fitting is a HOLOPHANE REFLECTOR



BELOW :—
SECTIONAL VIEW SHOWING
HOLOPHANE REFLECTOR





ABOVE :—
SECTIONAL VIEW SHOWING
POSITION OF REFLECTOR

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